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State of New Jersey
REPORT
COMMISSIONER
OF
PUBLIC ROADS
1902

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13

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GRATIS



Deep cut, Holmdel and Marlboro road, Monmouth Co., during improvement.



Deep cut, Holmdel and Marlboro road, Monmouth Co., after improvement.

NINTH ANNUAL REPORT

OF THE

SECTION.	DIVISION.	BOOK.
4	- 25.6 -	9

Commissioner of Public Roads

FOR THE YEAR ENDING OCTOBER 31ST,

1902.

TRENTON, N. J.:
THE JOHN L. MURPHY PUBLISHING CO., PRINTERS
1902

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OFFICE OF COMMISSIONER OF PUBLIC ROADS.

TRENTON, NEW JERSEY, November 30th, 1902.

To His Excellency Franklin Murphy, Governor, and the Legislature of New Jersey:

As required by the State Aid Road Law, I have the honor to submit the ninth annual report of the Commissioner of Public Roads for the fiscal year ending October 31st, 1902, with such comments, quotations and suggestions as existing circumstances seem to require.

HENRY I. BUDD,
Commissioner of Public Roads.

(3)

REPORT.

In compliance with the act of March 22d, 1895, we make a statement of cost of roads that will claim this year's appropriation, as indicated by the figures below:

COST OF ROADS.

ATLANTIC COUNTY.

Hammonton and Pleasant Mills road.....		8.11 miles.
Cost	\$12,615 09	
State's share	4,205 03	
Pleasantville and May's Landing road.....		11.90 miles.
Cost	\$16,183 38	
State's share	5,394 46	
Total number of miles.....		20.10
Total paid the county.....		\$9,590 49

BERGEN COUNTY.

Hillsdale avenue (township road).....		.43 miles.
Cost	\$1,780 62	
State's share	593 54	
Railroad and Summit avenues (township road).....		.59 miles.
Cost	\$2,165 32	
State's share	721 77	
Total number of miles.....		1.02
Total paid the county.....		\$1,315 31

BURLINGTON COUNTY.

Medford and Red Lion road.....		4.40 miles.
Cost	\$20,204 31	
State's share	6,734 77	
Mount Holly and Smithville road.....		3.21 miles.
Cost	\$17,669 60	
State's share	5,889 87	
Burlington and Columbus road.....		4.70 miles.
Cost	\$24,004 25	
State's share	8,001 42	
Camden, Ellisburgh and Marlton turnpike.....		1.428 miles.
Cost	\$5,670 00	
State's share	1,890 00	

Westfield and Camden turnpike.....		5.303 miles.
Cost	\$12,000 00	
State's share	4,000 00	
Total number of miles.....		19.131
Total paid the county.....		\$28,516 06

CAMDEN COUNTY.

Clementon and Gibbsboro road.....		2.63 miles.
Cost	\$7,941 29	
State's share	2,647 10	
River road		3.21 miles.
Cost	\$31,818 04	
State's share	10,606 01	
Sandy Lane road.....		2.20 miles.
Cost	\$16,257 30	
State's share	5,419 10	
Stoy's Landing road.....		.76 miles.
Cost	\$5,497 05	
State's share	1,832 35	
Total number of miles.....		8.80
Total paid the county.....		\$20,504 56

CAPE MAY COUNTY.

Sensshore road		2.314 miles.
Cost	\$7,550 80	
State's share	2,516 93	
Asbury avenue		1 mile.
Cost	\$3,131 79	
State's share	1,043 93	
Ocean City and Beesley's Point turnpike.....		2.08 miles.
Cost	\$12,000 00	
State's share	4,000 00	
Total number of miles.....		5.394
Total paid the county.....		\$7,560 86

ESSEX COUNTY.

Sandford street		1.612 miles.
Cost	\$14,531 77	
State's share	4,843 92	
Sandford street extension.....		.591 miles.
Cost	\$5,513 97	
State's share	1,837 99	
Ridge road		2.04 miles.
Cost	\$13,857 42	
State's share	4,619 14	
West Passaic avenue.....		1.09 miles.
Cost	\$8,475 19	
State's share	2,825 06	
Mountain road		3.339 miles.
Cost	\$29,820 23	
State's share	9,940 08	
Total number of miles.....		8.723
Total paid the county.....		\$24,068 18

GLOUCESTER COUNTY.

Glassboro and Hardingville road.....		5.105 miles.
Cost	\$9,614 92	
State's share	3,204 97	
Delaware street		1.67 miles.
Cost	\$6,422 18	
State's share	2,140 73	
German street .....		.10 miles.
Cost	\$842 87	
State's share	280 96	
Total number of miles.....		6.875
Total paid the county.....		\$5,626 66

MERCER COUNTY.

Edinburgh, Dutch Neck and Princeton road.....		6.69 miles.
Cost	\$43,227 97	
State's share	14,400 32	
Hamilton avenue and Dogtown road.....		3.03 miles.
Cost	\$27,069 36	
State's share	9,023 12	
Trenton and Allentown turnpike, first section.....		2.52 miles.
Cost	\$12,351 54	
State's share	4,117 18	
Trenton and Allentown turnpike, second section.....		3.65 miles.
Cost	\$22,301 76	
State's share	7,433 92	
Total number of miles.....		15.89
Total paid the county.....		\$34,983 54

MIDDLESEX COUNTY.

Hightstown and Manalapan road.....		1.53 miles.
Cost	\$10,849 17	
State's share	3,616 39	
South River road.....		1.26 miles.
Cost	\$6,240 38	
State's share	2,080 13	
New Market road.....		2 miles.
Cost	\$8,798 63	
State's share	2,932 88	
South Plainfield road.....		1.34 miles.
Cost	\$5,251 62	
State's share	1,750 54	
Amboy and Keyport road.....		2.25 miles.
Cost	\$9,224 24	
State's share	3,074 75	
Union Valley and Half Acre road.....		1.30 miles.
Cost	\$1,717 64	
State's share	572 55	
Cranbury and Pleasant Hill road.....		2.32 miles.
Cost	\$4,263 55	
State's share	1,421 18	

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Dayton and Jamesburg		2.95 miles.
Cost	\$3,713 75	
State's share	1,237 92	
Total number of miles.....		14.95
Total paid the county.....		\$16,686 34

MONMOUTH COUNTY.

Holmdel and Marlboro road.....		3.43 miles.
Cost	\$29,135 78	
State's share	9,711 93	
Keyport and Keansburg road.....		1.92 miles.
Cost	\$12,336 78	
State's share	4,112 26	
R&d Bank and Oceanic road.....		3.19 miles.
Cost	\$21,579 84	
State's share	7,193 28	
Squankum and Lakewood road.....		4.71 miles.
Cost	\$9,700 00	
State's share	3,233 33	
Total number of miles.....		13.25
Total paid the county.....		\$24,250 80

MORRIS COUNTY.

Hamburg turnpike or Newfoundland road.....		.537 miles.
Cost	\$3,554 21	
State's share	1,134 74	
Newton turnpike		2.46 miles.
Cost	\$33,627 03	
State's share	11,209 01	
Newark and Pompton turnpike.....		.70 miles.
Cost	\$2,716 00	
State's share	905 33	
Passaic Valley road.....		4.302 miles.
Cost	\$35,623 06	
State's share	11,874 35	
James street		2.03 miles.
Cost	\$10,310 74	
State's share	3,436 91	
Total number of miles.....		10.639
Total paid the county.....		\$28,610 34

OCEAN COUNTY.

Lakewood road, second section.....		3.90 miles.
Cost	\$10,715 98	
State's share	3,572 00	
Total number of miles.....		3.90
Total paid the county.....		\$3,572 00

COMMISSIONER OF PUBLIC ROADS.

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PASSAIC COUNTY.

Naughtpunch road		3.50 miles.
Cost	\$14,533 60	
State's share	4,844 53	
Highland avenue .....		.80 miles.
Cost	\$3,333 28	
State's share	1,111 09	
Hamburg turnpike and Oakland road.....		1.70 miles.
Cost	\$8,946 95	
State's share	2,982 32	
Laurel street and Crosby avenue.....		.57 miles.
Cost	\$1,126 00	
State's share	375 33	
Total number of miles.....		6.57
Total paid the county.....		\$9,313 27

SALEM COUNTY.

Salem and Hancock's Bridge road.....		1.07 miles.
Cost	\$2,997 34	
State's share	999 11	
Pedricktown road		2.18 miles.
Cost	\$13,038 60	
State's share	4,346 20	
Total number of miles.....		3.25
Total paid the county.....		\$5,345 31

SOMERSET COUNTY.

Conover's Corner and Liberty School House road.....		3.38 miles.
Cost	\$19,858 86	
State's share	6,619 62	
Skillman road		2.50 miles.
Cost	\$14,461 38	
State's share	4,820 46	
Total number of miles.....		5.88
Total paid the county.....		\$11,440 08

UNION COUNTY.

Union, Elizabeth and Orange avenues (township road).....		1.178 miles.
Cost	\$5,685 75	
State's share	1,895 25	
Walnut avenue (township road).....		.963 miles.
Cost	\$4,424 73	
State's share	1,474 91	
Total number of miles.....		2.141
Total paid the county.....		\$3,370 16

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WARREN COUNTY.

Washington avenue, Belvidere avenue and Broad street.....	1.422 miles.
Cost	\$9,268 58
State's share	3,089 53
Blairstown road	1.04 miles.
Cost	\$7,883 21
State's share	2,627 74
Continuation of Morris turnpike.....	6.33 miles.
Cost	\$34,565 30
State's share	11,521 76
Total number of miles.....	8.792
Total paid the county.....	\$17,239 03
Total number of miles paid for in 1902.....	155.305
Total cost to the State.....	\$250,000 00
Appropriation	\$250,000 00

The following roads are approaching completion, but were not finished in time to receive the State's aid in 1902:

ATLANTIC COUNTY.

	<i>No. of Miles.</i>	<i>Cost.</i>
Absecon and Chestnut Neck.....	11.00	\$12,750 00

BURLINGTON COUNTY.

Piper's Corner and Indian Mills.....	4.00	\$6,000 00
New Gretna	5.00	5,000 00
Burlington and Columbus, second section.....	2.28	9,645 75
	11.28	\$20,645 75

CAMDEN COUNTY.

Stoy's Landing, second section.....	.76	\$5,894 43
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CAPE MAY COUNTY.

Seashore	3.864	\$12,601 58
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GLOUCESTER COUNTY.

Clayton and Williamstown.....	5.96	\$12,000 00
Asbury avenue806	2,724 00
	6.766	\$14,724 00

MERCER COUNTY.

Marshall's Corner and Woodsville.....	2.43	\$25,000 00
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MIDDLESEX COUNTY.

	<i>No. of Miles.</i>	<i>Cost.</i>
New Brunswick and Bound Brook.....	2.50	\$12,974 00
Sayreville and South Amboy.....	2.25	8,703 00
Morristown and Lawrence Harbor.....	1.97	3,100 00
	6.72	\$24,777 00

MONMOUTH COUNTY.

Main street, Matawan	1.50	\$9,300 00
Ocean avenue, Long Branch.....	1.76	15,013 18
Extension of Navesink road.....	2.32	6,700 00
	5.58	\$31,013 18

MORRIS COUNTY.

Newton turnpike, Randolph township.....	3.61	\$53,400 00
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OCEAN COUNTY.

Lakewood, first section.....	3.70	\$18,498 00
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PASSAIC COUNTY.

Squaw Brook	1.46	\$6,825 00
Paterson and Hamburg turnpike.....	3.71	11,895 00
Macopin	2.75	12,629 10
Clove88	5,288 10
	8.80	\$36,637 20

SALEM COUNTY.

Elmer and Alloway	3.87	\$9,409 75
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Total number of miles approaching completion.....		68.38
Total cost		\$265,352 09

Specifications for the following roads have been and are being prepared, some of which are under and are being placed under contract for construction, and will claim the State's appropriation for the fiscal year beginning November 1st, 1902, and ending October 31st, 1903:

ATLANTIC COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
Atlantic City and Pleasantville Boulevard.....	3.50	\$83,000 00

BURLINGTON COUNTY.

Red Lion and Vincentown.....	3.50	\$20,000 00
Bordentown and Crosswicks.....	4.00	20,000 00
Bordentown and Chesterfield.....	4.00	20,000 00
	12.00	\$60,000 00

CAMDEN COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
Haddonfield and Gibbsboro.....	5.00	\$25,000 00

CAPE MAY COUNTY.

Wildwood and Rio Grande.....	2.34	\$9,500 00
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MERCER COUNTY.

River Drive	8.00	\$40,000 00
Hamilton Square and White Horse.....	5.25	27,000 00
Princeton Basin and Princeton.....	.80	5,000 00
	<hr/> 14.05	<hr/> \$72,000 00

MONMOUTH COUNTY.

Coliss avenue	4.00	\$8,000 00
Manalapan and Freehold.....	6.30	47,500 00
Blue Ball and Lakewood.....	8.14	17,514 00
	<hr/> 18.44	<hr/> \$73,014 00

MORRIS COUNTY.

Boonton and Singac.....	8.16	\$45,000 00
Morristown and Green Village.....	3.40	20,000 00
	<hr/> 11.56	<hr/> \$65,000 00

OCEAN COUNTY.

Lakehurst and New Egypt.....	10.37	\$26,000 00
West Point Pleasant.....	.70	1,500 00
	<hr/> 11.07	<hr/> \$27,500 00

SALEM COUNTY.

Pennsville and Salem.....	4.00	\$8,000 00
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SOMERSET COUNTY.

Neshanic and Wood's Tavern.....	6.24	\$35,650 00
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WARREN COUNTY.

Continuation of Morris turnpike.....	3.50	\$20,000 00
Hackettstown and Blairstown.....	5.00	25,000 00
	<hr/> 8.50	<hr/> \$45,000 00

Total number of miles.....		96.79
Total estimated cost.....		\$476,664 00

During the years 1893 and 1894 there was built in

Middlesex county	16.09 miles.
Mercer county	12.78 "
Camden county	14.50 "
Burlington county	31.47 "

Total number of miles built in 1893 and 1894.....	74.84
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During the year 1895 there was built in

Burlington county	9.75 miles.
Camden county	8.25 "
Essex county	6.50 "
Gloucester county	7.75 "
Middlesex county	7.62 "
Mercer county	6.40 "

Total number of miles built in 1895.....	46.27
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During the year 1896 there was built in

Atlantic county	12.00 miles.
Burlington county	11.01 "
Essex county	6. "
Gloucester county	6. "
Mercer county	10.95 "
Middlesex county	9. "
Monmouth county	3.75 "
Salem county	2.67 "

Total number of miles built in 1896.....	61.38
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During the year 1897 there was built in

Atlantic county	10.50 miles.
Burlington county	10. "
Camden county	4.12 "
Essex county	5.00 "
Gloucester county	5.50 "
Mercer county	4.75 "
Middlesex county	4.75 "
Morris county	6.12 "
Monmouth county	5. "
Dassau county	4.75 "
Somerset county	6.20 "

Total number of miles built in 1897.....	66.69
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During the year 1898 there was built in

Atlantic county	6.80 miles.
Burlington county	14.91 "
Camden county	12.80 "
Essex county	9.60 "
Gloucester county	7.60 "
Mercer county	2.70 "
Middlesex county	6.17 "
Monmouth county	5.11 "
Morris county	6.10 "
Passaic county	5.88 "
Somerset county	7.25 "

Total number of miles built in 1898..... 84.92

During the year 1899 there was built in

Atlantic county	3.82 miles.
Burlington county	18.50 "
Camden county	2.20 "
Essex county	12.02 "
Gloucester county	12.80 "
Mercer county	10.92 "
Middlesex county	13.87 "
Monmouth county	15.06 "
Morris county	8.00 "
Passaic county	8.67 "
Salem county	2.17 "
Somerset county	6.60 "
Warren county	0.09 "

Total number of miles built in 1899..... 114.72

During the year 1900 there was built in

Burlington county	8.93 miles.
Camden county	1.00 "
Essex county	9.60 "
Gloucester county	9.08 "
Hudson county	2.44 "
Mercer county	9.16 "
Middlesex county	9.01 "
Monmouth county	8.28 "
Morris county	6.53 "
Passaic county	6.73 "
Salem county	2.45 "
Somerset county	6.65 "
Union county	3.43 "

Total number of miles built in 1900..... 83.29

During the year 1901 there was built in

Atlantic county	7.03 miles.
Burlington county	17.36 "
Camden county	4.48 "
Cape May county	6.00 "
Essex county	9.36 "
Gloucester county	17.44 "
Mercer county	10.37 "
Middlesex county	6.12 "
Monmouth county	6.67 "
Morris county	4.306 "
Passaic county	3.987 "
Somerset county	7.93 "
Sussex county .....	.893 "
Warren county	7.43 "
Total number of miles built in 1901.....	109.376

During the year 1902 there was built in

Atlantic county	20.10 miles.
Bergen county	1.02 "
Burlington county	19.131 "
Camden county	8.80 "
Cape May county	5.394 "
Essex county	8.723 "
Gloucester county	6.875 "
Mercer county	15.89 "
Middlesex county	14.95 "
Monmouth county	13.25 "
Morris county	10.639 "
Ocean county	3.90 "
Passaic county	6.57 "
Salem county	3.25 "
Somerset county	5.88 "
Union county	2.141 "
Warren county	8.792 "
Total number of miles built in 1902.....	155.305

Names and lengths of the roads built in 1902:

ATLANTIC COUNTY.

	Miles.
Hammonton and Pleasant Mills.....	8.11
Pleasantville and May's Landing.....	11.99
	20.10

BERGEN COUNTY.

Hillsdale avenue .....	.43
Railroad and Summit avenues.....	.59
	1.02

BURLINGTON COUNTY.

	<i>Ints.</i>
Medford and Red Lion.....	4.49
Mount Holly and Smithville.....	3.21
Burlington and Columbus.....	4.70
Camden, Ellisburgh and Marlton turnpike.....	1.428
Westfield and Camden turnpike.....	5.303
	<hr/> 19.131

CAMDEN COUNTY.

Clementon and Gibbsboro.....	2.63
River	3.21
Sandy Lane	2.20
Stoy's Landing .....	.76
	<hr/> 8.80

CAPE MAY COUNTY.

Seashore	2.314
Asbury avenue	1.00
Ocean City and Beesley's Point turnpike.....	2.08
	<hr/> 5.394

ESSEX COUNTY.

Sandford street	1.612
Sandford street extension.....	.591
Ridge road	2.04
West Passaic avenue	1.09
Mountain	3.39
	<hr/> 8.723

GLOUCESTER COUNTY.

Glassboro and Hardingville.....	5.105
Delaware street	1.67
German street .....	.10
	<hr/> 6.875

MERCER COUNTY.

Edinburgh, Dutch Neck and Princeton.....	6.69
Hamilton avenue and Dogtown.....	3.03
Trenton and Allentown turnpike, first section.....	2.52
Trenton and Allentown turnpike, second section.....	3.65
	<hr/> 15.89

MIDDLESEX COUNTY.

Hightstown and Manalapan.....	1.53
South River	1.26
New Market	2.00
South Plainfield	1.34
Amboy and Keyport.....	2.25
Union Valley and Half Acre.....	1.30
Cranbury and Pleasant Hill.....	2.32
Dayton and Jamesburg.....	2.95
	<hr/> 14.95

MONMOUTH COUNTY.

	<i>Miles.</i>
Holmdel and Marlboro.....	3.43
Keyport and Keansburg.....	1.92
Red Bank and Oceanic.....	3.19
Squankum and Lakewood.....	4.71
	<hr/> 13.25

MORRIS COUNTY.

Hamburg turnpike .....	.587
Newton	2.46
Newark and Pompton.....	.70
Passaic Valley	4.302
James street	2.03
	<hr/> 10.639

OCEAN COUNTY.

Lakewood, second section.....	3.90
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PASSAIC COUNTY.

Naughtpunch	3.50
Highland avenue80
Hamburg turnpike and Oakland.....	1.70
Laurel street and Crosby avenue.....	.57
	<hr/> 6.57

SALEM COUNTY.

Salem and Hancock's Bridge.....	1.07
Pedricktown	2.18
	<hr/> 3.25

SOMERSET COUNTY.

Conover's Corner and Liberty School House.....	3.38
Skillman	2.50
	<hr/> 5.88

UNION COUNTY.

Union, Elizabeth and Orange.....	1.178
Walnut avenue .....	.963
	<hr/> 2.141

WARREN COUNTY.

Washington and Belvidere avenues and Broad street.....	1.422
Morris turnpike	6.33
Blairstown	1.04
	<hr/> 8.792
	<hr/> 155.305

During the year 1902 there was built in

<i>County.</i>	<i>No. of miles paid for.</i>	<i>No. of miles not paid for.</i>	<i>Total No. of miles.</i>
Atlantic	20.10	11.00	31.10
Bergen	1.02	.....	1.02
Burlington	19.131	11.28	30.411
Camden	8.80	.76	9.56
Cape May	5.394	4.664	10.058
Essex	8.723	.....	8.723
Gloucester	6.875	5.96	12.835
Mercer	15.89	.....	15.89
Middlesex	14.95	6.72	21.67
Monmouth	13.25	5.58	18.83
Morris	10.639	.....	10.639
Ocean	3.90	.....	3.90
Passaic	6.57	.....	6.57
Salem	3.25	.....	3.25
Somerset	5.88	.....	5.88
Union	2.141	.....	2.141
Warren	8.792	.....	8.792
	<hr/> 155.305	<hr/> 45.964	<hr/> 201.269

The total amount expended by the State and the number of miles paid for in each county since the passage of the State Aid Law, are as follows:

<i>County.</i>	<i>Miles.</i>	<i>Amount.</i>
Atlantic	60.25	\$33,915 27
Bergen	1.02	1,315 31
Burlington	141.061	214,307 57
Camden	56.15	110,508 99
Cape May	11.394	13,534 34
Essex	66.803	141,046 52
Gloucester	73.045	80,394 93
Hudson	2.44	8,944 60
Mercer	83.92	198,588 29
Middlesex	87.58	145,412 91
Monmouth	57.12	81,310 97
Morris	41.695	74,512 76
Ocean	3.90	3,572 00
Passaic	36.587	50,930 84
Salem	10.54	10,096 05
Somerset	40.51	59,433 45
Sussex .....	.893	1,733 87
Union	5.571	7,689 51
Warren	16.312	27,925 37
	<hr/> 796.791	<hr/> \$1,265,168 55

AMOUNT AVAILABLE FOR ROAD BUILDING IN EACH COUNTY.

Under the State Aid law, the estimated cost of all improvements made under this act, together with the estimated cost of repairs of roads already constructed, in any county in any one year, shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year.

The following table will show at a glance the limitations of expenditures in each county, also the amount that can be expended, provided the State appropriation is liberal enough to meet it. For example: Atlantic county, with ratables amounting to \$28,982,749 could expend per year, if State appropriation were sufficient, \$72,456.87; a rate, if applied to all the counties, even with the cost of repairs to roads already built deducted, would, in a few years, cover all our leading roads with stone and gravel:

<i>County.</i>	<i>Abstract of Ratables for 1902.</i>	<i>One-fourth of one per cent.</i>
Atlantic	\$28,982,749 00	\$72,456 87
Bergen	43,075,496 00	107,688 74
Burlington	22,060,974 00	55,152 44
Camden	42,084,656 00	105,211 64
Cape May	8,460,000 00	21,150 00
Cumberland	17,420,000 00	43,550 00
Essex	230,197,268 00	575,493 17
Gloucester	14,770,846 00	36,927 12
Hudson	180,825,890 00	452,064 73
Hunterdon	17,655,321 00	44,138 30
Mercer	47,379,850 00	118,449 63
Middlesex	28,935,140 00	72,337 85
Monmouth	49,954,350 00	124,885 88
Morris	28,710,357 00	71,775 89
Ocean	9,318,204 00	23,295 51
Passaic	71,350,830 00	178,377 08
Salem	13,937,435 00	34,843 59
Somerset	18,860,181 00	47,150 45
Sussex	14,911,121 00	37,277 80
Union	45,269,400 00	113,173 50
Warren	18,400,472 00	46,001 18

The following roads have been and are being petitioned for, to be improved under the State Aid act:

ATLANTIC COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
May's Landing and Tuckahoe—gravel.....	11.00	\$16,500 00
May's Landing and Downtown—gravel.....	14.00	21,000 00
Pleasantville and Atlantic City.....	3.58	83,300 00
	<hr/> 28.58	<hr/> \$120,800 00

BERGEN COUNTY.

Cherry Run—stone.....	1.75	\$9,000 00
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BURLINGTON COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
Masonville and Moorestown—stone.....	3.00	\$15,000 00
Pemberton and Vincentown—stone.....	5.00	25,000 00
Pemberton and Turpentine—stone.....	6.00	30,000 00
Mount Holly and Bayrestown—stone.....	3.00	15,000 00
Red Lion and Vincentown—stone.....	4.00	20,000 00
Masonville and Coates' Corner—stone.....	3.51	17,000 00
Cross Road and Green Tree—stone.....	2.50	12,000 00
Green Tree Pike—stone.....	2.00	10,000 00
Red Lion and Tabernacle—stone.....	4.00	20,000 00
Indian Mills, Atsion and Batsto—gravel.....	9.50	19,000 00
Pemberton and Wrightstown—stone.....	6.00	30,000 00
Burlington and Jacksonville—stone.....	6.00	30,000 00
Burlington and Beverly—stone.....	3.00	15,000 00
Rancocas and Burlington—stone.....	4.00	20,000 00
Rancocas and Beverly—stone.....	5.00	25,000 00
Recklesstown and Mansfield—stone.....	1.60	8,000 00
Ward avenue, Crosswicks—stone.....	3.50	18,000 00
Medford and Wilkins streets—stone.....	1.50	7,000 00
Wrightstown and Rising Sun—stone.....	7.00	35,000 00
Keeler's Corner and Jacksonville—stone.....	2.00	10,000 00
Hartford to Bridgeboro—stone.....	3.30	16,000 00
Bordentown and Groveville—stone.....	3.00	15,000 00
Auback and Groveville bridge—stone.....	2.00	10,000 00
Georgetown and Wrightstown—stone.....	4.00	20,000 00
Bordentown and Florence—stone.....	5.00	25,000 00
Florence Station to Burlington city line—stone.....	4.00	20,000 00
Bordentown and Crosswicks—stone.....	4.00	20,000 00
Bordentown and Chesterfield—stone.....	6.00	30,000 00
Mount Laurel and Hainesport—stone.....	7.00	35,000 00
Ballenger's Mills and Tabernacle—gravel.....	4.00	6,000 00
Tabernacle and Chatsworth—gravel.....	10.50	21,000 00
New Egypt and Chatsworth—gravel.....	12.00	24,000 00
	<hr/> 152.90	<hr/> \$623,000 00

CAMDEN COUNTY.

Haddonfield and Gibbsboro—stone.....	4.00	\$20,000 00
Berlin and Milford—gravel.....	5.00	7,500 00
	<hr/> 9.00	<hr/> \$27,500 00

ESSEX COUNTY.

Caldwell and West Livingstone—stone.....	5.00	\$32,500 00
West Livingston and Northfield Church—stone.....	1.34	11,500 00
Northfield Church and Hobart's Gap—stone.....	4.00	26,000 00
Bloomfield avenue and Fairfield—stone.....	2.75	18,600 00
Fifth avenue, Verona—stone.....	1.00	7,500 00
Wall street and Stuyvesant avenue, Vailsburg—stone.....	3.00	24,000 00
Grove street, East Orange to Irvington—stone.....	1.75	15,000 00
Newark plank road—stone.....	.47	15,000 00
	<hr/> 19.31	<hr/> \$150,100 00

GLOUCESTER COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
Glassboro and Mullica Hill—gravel.....	6.50	\$13,000 00
Mullica Hill and Salem county line—gravel.....	5.00	10,000 00
Chapman's Mill road, Mullica Hill to Swedesboro— gravel	4.50	9,000 00
Jefferson and Paulsboro—gravel.....	5.50	11,000 00
Glassboro and Bridgeton—gravel.....	6.50	13,000 00
Auburn road, Swedesboro to Auburn—stone.....	3.50	17,500 00
Almonesson and Westville—stone.....	4.00	20,000 00
	<hr/> 35.50	<hr/> \$93,500 00

HUDSON COUNTY.

Newark plank road—stone.....	1.32	\$35,000 00
Belleville turnpike—stone	2.32	55,025 00
	<hr/> 3.64	<hr/> \$90,025 00

HUNTERDON COUNTY.

Middle Valley to Morris County line—stone.....	2.50	\$10,000 00
Rockaway Valley and New Germantown—stone.....	1.50	6,000 00
Lambertville and Ringoes—stone.....	3.00	12,000 00
	<hr/> 7.00	<hr/> \$28,000 00

MERCER COUNTY.

Ewingville School House—stone.....	2.25	\$10,000 00
Pennington and Centreville—stone.....	1.97	15,000 00
Shabbacong—stone	1.95	10,000 00
River road—stone	8.00	40,000 00
Olden avenue—stone	2.50	12,000 00
Joseph Reed's road—stone.....	3.00	15,000 00
White Horse and Hamilton Square—stone.....	5.25	27,000 00
Princeton Basin and Princeton—stone.....	.80	5,000 00
	<hr/> 25.72	<hr/> \$134,000 00

MIDDLESEX COUNTY.

Highland Park and Bonamtown—stone.....	3.00	\$15,000 00
Franklin Park and Kingston—stone—one-half mileage and cost	3.50	17,500 00
New Brunswick and Franklin Park—stone—one-half mileage and cost	2.75	13,062 50
Milltown and Spotswood—stone.....	4.00	20,000 00
Clifton and Ryder's Lane—stone.....	3.00	15,000 00
Woodbridge and Oak Tree—stone.....	4.10	20,000 00
Rahway and Woodbridge—stone.....	4.00	20,000 00
	<hr/> 24.35	<hr/> \$120,562 50

MONMOUTH COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
Allentown and New Egypt—stone.....	8.16	\$43,540 00
Amboy and Keyport—stone.....	2.00	10,189 00
Chingora and Broad street—stone.....	.88	8,433 00
Colt's Neck and Freehold—stone.....	5.47	40,000 00
Keyport and Middlesex—stone.....	2.00	10,000 00
Manalapan and Freehold—stone.....	6.30	47,500 00
Middlesex and Red Bank—stone.....	3.85	19,140 00
Red Valley and Allentown—stone.....	6.25	36,343 00
Blue Ball and Lakewood—gravel.....	8.14	17,514 00
Blue Ball and Freehold—gravel.....	3.00	6,000 00
Englishtown and Freehold—gravel.....	5.03	17,449 00
Corliss avenue—gravel.....	4.00	8,000 00
Manasquan and Belmar—gravel.....	6.29	20,000 00
Sweetman's Lane and Black's Mills—gravel.....	2.95	4,500 00
	<hr/> 64.32	<hr/> \$287,618 00

MORRIS COUNTY.

Long Hill and Gillette—stone.....	2.00	\$13,212 00
Chester to D. L. and W. R. R.—stone.....	.96	4,915 00
New Vernon (Sand Springs)—stone.....	2.00	10,400 00
Morristown and Green Village—stone.....	3.20	13,566 00
Whippany and Swinefield bridge—stone.....	5.00	18,000 00
Beavertown Plain and Boonton—stone.....	4.28	11,767 00
Pompton and Pequannock river—stone.....	4.30	17,000 00
Passaic and Mountain View—stone.....	2.60	7,800 00
Morristown and Speedwell lake—stone.....	2.00	6,000 00
Lower Mine Hill—stone.....	1.66	4,480 00
Ledgewood and Landing—stone.....	1.76	6,000 00
Denville and Boonton—stone.....	4.54	20,000 00
Troy Hills and Whippany—stone.....	3.34	16,000 00
Boonton and Singac—stone.....	8.16	45,000 00
	<hr/> 45.80	<hr/> \$194,140 00

OCEAN COUNTY.

Long Beach—gravel.....	15.00	\$30,000 00
Seaside Park—gravel.....	12.00	24,000 00
Lakehurst, New Egypt—gravel.....	10.37	26,000 00
West Point Pleasant and Atlantic Ocean.....	.87	2,735 00
	<hr/> 38.24	<hr/> \$82,735 00

PASSAIC COUNTY.

Lackawanna avenue—stone.....	2.00	\$10,000 00
Morton House and Bergen county line—stone.....	2.00	10,000 00
Midvale and Greenwood lake—stone.....	10.00	40,000 00
Mountain View and Singac—stone.....	2.47	12,500 00
	<hr/> 16.47	<hr/> \$72,500 00

SALEM COUNTY.

	<i>Miles.</i>	<i>Est. Cost.</i>
Salem and Pennsville—shell.....	6.00	\$15,000 00
Salem and Woodstown—shell.....	4.00	10,000 00
	<hr/> 10.00	<hr/> \$25,000 00

SOMERSET COUNTY.

Basking Ridge and Blazier's Corner—stone.....	3.00	\$13,500 00
Union avenue, Somerville, to Raritan—stone.....	2.16	10,280 00
New Brunswick and Franklin Park—stone—one-half mileage and cost.....	2.75	13,062 50
Franklin Park and Kingston—stone—one-half mile- age and cost.....	3.50	17,500 00
Plainfield and Morristown—stone.....	2.50	14,250 00
Dead River and Liberty Corner—stone.....	3.00	14,250 00
Rocky Hill and Kingston—stone.....	1.10	6,813 00
Stoutsbury and Plainville—stone.....	4.50	26,023 00
Basking Ridge and Van Doren's Mills—stone.....	2.33	11,875 00
Wood's Tavern and Neshanic—stone.....	6.24	35,650 00
Somerville and Wagner's Corner—stone.....	1.00	4,750 00
Franklin Park and Middlebush—stone.....	5.00	23,750 00
Labaw's Corner and Princeton—stone.....	4.06	19,000 00
Union avenue and Blackwell's Mill, Findern—stone..	6.50	32,500 00
Pleasant View School House and Millstone—stone...	4.75	22,562 00
Millstone and Wood's Tavern—stone.....	3.25	16,250 00
Far Hills and Gladstone, Pepack—stone.....	4.00	20,000 00
Bedminster and Lamington—stone.....	4.50	22,500 00
Far Hills and Liberty Corner—stone.....	4.00	22,000 00
	<hr/> 68.14	<hr/> \$346,495 50

Total number of miles petitioned for in all the counties.....	550.72
Total estimated cost of all the roads petitioned for.....	\$2,404,851 00

DESCRIPTION OF ROADS IMPROVED IN 1902.

ATLANTIC COUNTY.

Pleasantville and May's Landing Road, 11.99 Miles Long.

This road begins at Pleasantville, and extends through McKee City to May's Landing. It is built of gravel, fourteen feet wide, six and eight inches thick. It extends principally through a wooded district, over a sandy and gravelly loam soil. There are a few settlements along its line.

This road affords an easy means of access for the inhabitants of Atlantic City and Pleasantville to the county seat, and a fine drive, towards the metropolis of Atlantic City, for all the country that lies north. It passes through McKee City, one of the enterprising settlements started in the Jersey pines. It will be an incentive for the improvement of the land along the whole line.

Alvin P. Risley, Pleasantville, New Jersey, and Edmond H. Camp, Atlantic City, New Jersey, were the contractors.

The maximum grade was reduced from 4.60 per cent. to 2.80 per cent.

The price per cubic yard for compacted gravel was 30 cents.

The total cost was \$17,518.63.

Hammonton and Pleasant Mills Road, 8.11 Miles Long.

This road extends over a sandy and gravelly loam soil from the village of Hammonton to Pleasant Mills, through a series of small farms, ten, twenty, thirty and fifty acres, the owners of which are principally engaged in berry-raising. At Pleasant Mills there is a large paper-mill, manufacturing large quantities

of fine paper. This road there connects with the Batsto road in Burlington county, and is a link in a chain of roads connecting Hammonton and the Camden and Absecon road with the system of roads in Burlington county. The land is almost level, requiring very little grading. It is built of gravel, fourteen feet wide, six and eight inches thick.

John Hanselman, Egg Harbor, New Jersey, was the contractor.

The maximum grade was reduced from 4.58 per cent. to 2 per cent.

The price per cubic yard for compacted gravel was 30 cents.

The total cost was \$13,520.93.

BERGEN COUNTY.

Railroad, Summit and Hillsdale Avenues, 1.02 Miles Long.

Railroad and Summit avenues begin at the Westwood line and extend northerly to the end of the township. Hillsdale avenue begins at Trall's Corner and extends westerly to the culvert near Mr. Oakley's. The construction is as follows: Six hundred and seventy-five feet of telford, fourteen feet wide and eight inches thick; nine hundred and seven feet of macadam, fourteen feet wide and six inches thick, the entire length covered with a layer of one-inch of Marcellus shale.

The road is built over a sandy and clay loam soil, and a mixture of glacial drift and river deposits. This section is developing rapidly as a suburban place of residence, and the attractive farms along the road are being rapidly converted into lawns and gardens.

Thomas E. Brickell was the contractor.

The maximum grade on Railroad and Summit avenues was reduced from 4 per cent. to 3.1 per cent.; on Hillsdale avenue, from 5.5 per cent. to 2.9 per cent.

The cost per contract was \$4,384.37.

The total cost was \$4,688.08.



River road, Camden Co., before improvement.



River road, Camden Co., after improvement.

BURLINGTON COUNTY.

Burlington and Columbus Road, 6.98 Miles Long, 4.70 Miles of Which Are Paid for This Year.

This road begins at the crown of the railroad arch in the village of Columbus, and extends to the bridge over Assiscunk creek, Burlington. It is constructed of macadam, fourteen feet wide and six inches thick. For the most of its course it traverses a fine agricultural country, over a sandy and sandy loam soil. Along and tributary to the road are many fine farms that have been productive for nearly two centuries. This road renders it easy for the tenants of these farms to carry their productions to the markets of Burlington, and over the connecting stone roads through the thriving river villages to the Camden and Philadelphia markets. At its eastern end this road connects with the Columbus, Bordentown and Trenton road, which enables the farmers to carry their products to the manufacturing city of Trenton. It also forms a connection between the improved road passing through Columbus and the improved roads leading from Burlington to Camden, giving a direct course by way of Burlington for vehicles of all kinds to Camden and Philadelphia, and virtually opening up another through line across the State.

J. Roosevelt Shanley, New York City, was the contractor.

The maximum grade was reduced from 6 per cent. to 4 per cent.

The price per contract, lump sum, was \$34,900.

The total cost was \$35,650.

Medford and Red Lion Road, 4.493 Miles Long.

This road begins at Branch and Main streets, in the town of Medford, and extends to Red Lion. It is built of macadam, ten, fourteen and sixteen feet wide, and six and eight inches thick. The soil over which it is built is composed principally of black sand. The products of the country through which the road extends are hay, rye, corn and milk. A large portion of the road in the neighborhood of Chairville has a very sandy bot-

tom upon which we have succeeded in making a very substantial macadam. This road skirts the edge of the pines and is part of a continuous line towards Tabernacle; when four more miles are built a very rich farming section will be opened to the markets of Philadelphia, to which there is, at present, access only over very heavy, sandy roads.

The Delaware River Quarry and Construction Company, Jersey City, New Jersey, was the contractor.

The maximum grade was reduced from 4 per cent. to 3 per cent.

The cost per contract, lump sum, was \$17,748.11.

The total cost was \$21,147.44.

Mount Holly and Smithville Road, 3.21 Miles Long.

This road extends from the town of Mount Holly to the manufacturing village of Smithville. It is built of macadam, twelve feet wide and eight inches thick. The country through which it passes is a very fine farming section. The road is mainly used for the heavy traffic between the manufacturing town of Smithville and Mount Holly. Many of the operators at Smithville live in Mount Holly, and this road gives them easy access to their work; besides, a large amount of the products of these factories is carried over this road.

J. R. Shanley, Newark, New Jersey, was the contractor.

The maximum grade was reduced from 6 per cent. to 3 per cent.

The price per contract, lump sum, was \$17,378.

The total cost was \$17,378.

Westfield and Camden Turnpike, 5.30 Miles Long.

This road begins at the bridge over Pensauken creek, and extends to Bridgeboro, and includes a branch pike extending from the five points above Pensauken creek to the intersection of the road leading from Westfield to Moorestown. It is constructed of telford and macadam, ten inches thick, and is fourteen feet wide. It passes through a very fine and thickly-settled farming



River road, Camden Co., before improvement.



River road, Camden Co., after improvement. Cribbing on both sides.

district, and is part of a macadamized road extending from Burlington city to Camden. When the Camden county freeholders purchase their end, there will be a free, improved road from Burlington to the Philadelphia markets. A portion of the road is a gravel turnpike which is to be macadamized under the State Aid Law.

J. F. and B. M. Shanley, Jersey City, New Jersey, were the contractors.

The maximum grade was reduced from 8 per cent. to 4 per cent.

The purchase price was \$12,000.

Camden, Ellisburgh and Marlton Turnpike, 1.43 Miles Long.

This road begins in the village of Marlton, and extends to the line between the counties of Burlington and Camden. It is constructed of telford and macadam, ten inches thick, and is fourteen feet wide. It passes through a rich, well-settled farming country, part of the way through the thriving village of Marlton. It is part of a macadamized road from Vincentown to Camden. When Camden county purchases its end, there will be a continuous stone road from the rich farming districts surrounding Vincentown all the way to the Philadelphia markets.

J. F. and B. M. Shanley, Jersey City, New Jersey, were the contractors.

The maximum grade was reduced from 4 per cent. to 2 per cent.

The purchase price was \$5,670.

CAMDEN COUNTY.

Clementon and Gibbsboro Road, 2.63 Miles Long.

This road begins at Clementon, and extends to Gibbsboro. It is constructed of gravel, fourteen feet wide, six and eight inches thick. The soil is principally sandy. A large part of the way the road extends through a piney section, each side lined with oak and pine trees.

Elias A. Russell and Jacob Sickler were the contractors.

The maximum grade was reduced from 7.40 per cent. to 4.20 per cent.

The price per cubic yard for compacted gravel was 31 cents.

The total cost was \$8,890.26.

Stoy's Landing Road, 1.42 Miles Long, of Which .76 of a Mile Was Constructed This Year.

This road begins at Haddonfield, and extends to Marlton pike. It is built of macadam, twelve feet wide and eight inches thick. This road, with the Marlton and Camden pike, affords another outlet to the thriving towns north. It passes through a good agricultural district, over a sandy loam soil. Many quicksand bottoms were encountered in the cuts, necessitating telford foundation. It connects Haddonfield with the improved roads running north and east to Marlton, Medford and Moorestown.

J. R. Shanley, New York City, was the contractor.

The maximum grade was reduced from 6.20 per cent, to 3.40 per cent.

The cost per contract, lump sum, was \$8,950.

The total cost of .76 of a mile was \$5,894.43.

Sandy Lane Road, 2.20 Miles Long.

This road begins at the White Horse stone road, near Lawnside, and extends westwardly to the Blackwoodtown turnpike at Heading. It is constructed of macadam, twelve feet wide and ten inches thick. It passes through a good farming section in which there is a great deal of material raised for the Philadelphia markets, and affords a short outlet for the people traveling over the White Horse stone road to reach the Gloucester ferry, saving several miles of transportation to the Philadelphia markets.

The Delaware Granite and Mining Company, Wilmington, Delaware, was the contractor.



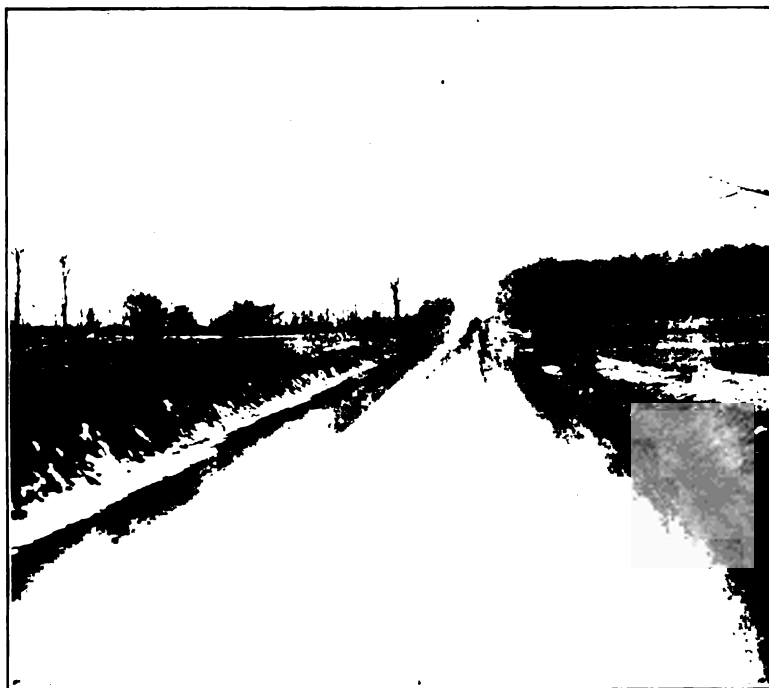
Stoy road, near Maple ave., Camden Co., before improvement.



Stoy road, near Maple ave., Camden Co., after improvement.



River road, Camden Co., before improvement.



River road, Camden Co., after improvement.

The maximum grade was reduced from 10.60 per cent. to 3.23 per cent.

The price per contract, lump sum, was \$15,840.

The total cost was \$17,066.38.

River Road, 3.21 Miles Long.

This road begins at the boundary line of the city of Camden, and extends in a northerly direction to Pensauken creek, connecting there with the Burlington county system of stone roads, making a continuous line from Burlington to Camden. It is built of macadam, fifteen feet wide and ten inches thick. This road crosses many deep ravines which have been expensive to grade. It passes over a sandy and clay-gravelly soil, principally devoted to truck and fruit-growing. Large brick and tile works are located along the line. It passes through Delair and other thriving suburban towns, and will, no doubt, attract many new settlers, on account of the many long, continuous drives that are possible by its numerous connections with other improved roads.

B. F. Sweeten & Son, Camden, New Jersey, were the contractors.

The maximum grade was reduced from 9.18 per cent. to 4.81 per cent.

The price per contract, lump sum, was \$30,615.41.

The total cost was \$34,156.15.

CAPE MAY COUNTY.

*Seashore Road, 12.17 Miles Long, 6 Miles Built Last Year, 6.178
Built This Year, 2.314 Miles of Which Are Paid for
This Year.*

This road begins at Crook's creek bridge, in Middle township, and extends to Cape Island turnpike. It is built of gravel, fourteen feet wide, six and eight inches thick. The gravel, which is of a very fine quality, was obtained from the Moore gravel pits, near Tuckahoe. This road makes a complete line

from Cape May City to Cape May Court House. The country through which it passes is level, flat, farming land, composed of a sandy loam soil, sand predominating.

Fine drives are a much-needed acquisition to Cape May, and this one will give to the inhabitants thereof and the numerous summer visitors a fine outlet to exercise their steeds, and also an outlet for the produce of the many truck farmers, living along its line, to the markets of Cape May City.

B. F. Sweeten & Son, Camden, New Jersey, were the contractors.

The maximum grade was and is practically level.

The total cost of the 6.178 miles built this year was \$20,152.38.

Asbury Avenue, 1.80 Miles Long.

This road begins at Seventeenth street, Ocean City, and extends along the middle line of said Asbury avenue southwardly, 1.80 miles, to the northwardly line of Thirty-fourth street. It is built of gravel, fourteen feet wide, six and eight inches thick. This is a portion of a lengthy avenue which is being rapidly built upon by many of the numerous settlers who are making Ocean City one of the largest of our summer resorts.

Frederick T. Moore, Atlantic City, New Jersey, was the contractor.

The maximum grade was reduced from 3 per cent. to 2 per cent.

The cost per contract, lump sum, was \$1,660.73.

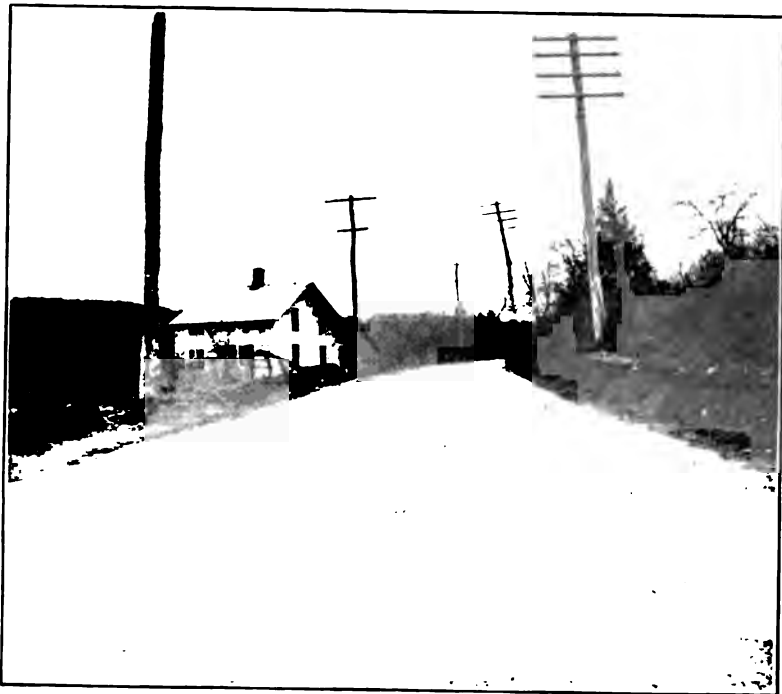
The total cost was \$3,548.51.

Ocean City and Beesley's Point Turnpike, 2 Miles Long.

This road extends from Ocean City, across the meadows to the main land. It is constructed of poles laid on stringers and covered with gravel. This turnpike was owned by the Ocean City Land Company. It was purchased by the freeholders under the State Aid Turnpike Law, allowing freeholders to buy the same. Their action was approved by the Road Commissioner. It is built across a salt marsh and connects Ocean City with the main land.



Ridge road, Essex Co., before improvement.



Ridge road, Essex Co., after improvement.

It is the only outlet for travel by wagon-road from the city to the main land. It is contemplated to re-surface this road with oyster shells and gravel at the expense of the county and State.

The maximum grade was and is about 2 per cent.

The purchase price was \$12,000 for the road, \$2,000 for bridges.

ESSEX COUNTY.

Ridge Road. 2.041 Miles Long.

This road begins at the Pompton turnpike, in the township of Verona, and extends northerly to the Passaic county line. It is built of telford, five inches, and macadam, three inches thick, and is sixteen feet wide.

This road forms a connecting link between the improved roads of Essex and Passaic counties. Traversing, as it does, the ridge back of Montclair and passing the large reservoir now being built by the city of Newark, and which will ere long be embraced in the parking system of Essex county, it forms not only an outlet for the farmers, truck-raisers and dairymen along its line, but also a beautiful pleasure drive for the residents of the Oranges, Montclair, Paterson and Little Falls. Its continuation, running into Main street in the town of Little Falls, completes the circuit of pleasure drives in this section of Essex county.

Frank J. Marley, Paterson, New Jersey, was the contractor.

The maximum grade was reduced from 9.59 per cent. to 5.10 per cent.

The cost per square yard for eight-inch telford was 54 cents.

The total cost was \$13,857.42.

West Passaic Avenue, 1.09 Miles Long.

This road begins at Broad street, in the town of Brookdale, and extends northwardly to the Passaic county line, forming a connecting link between the improved roads of Essex and Passaic counties. It makes a very picturesque drive from Montclair

and Bloomfield to the Passaic river. It is built of macadam, sixteen feet wide, eight inches thick, and will form not only a pleasure drive but also a much-needed outlet for the truck-raisers and milkmen to the large markets of Newark.

The Osborne and Marsellis Company, Montclair, New Jersey, was the contractor.

The maximum grade was reduced from 8.84 per cent. to 6.75 per cent.

The price per square yard for eight-inch macadam was 55 cents.

The total cost was \$8,475.19.

Sandford Street, 2.20 Miles Long.

This street begins at the East Orange line, and extends southerly through Vailsburgh to Springfield avenue, in the town of Irvington. It is built of telford, five inches, and macadam, three inches thick, and is sixteen feet wide.

This road forms a connecting link between the Oranges and Irvington that has long been needed. In fact, the condition of this street has retarded the march of improvement along its length, as, during the spring and fall, this road was almost impassable for loaded wagons. It forms one of the connecting links that are demanded to connect the east and west lines of improved roads previously built in this county.

Ludwig Batt, South Orange, New Jersey, was the contractor.

The maximum grade was reduced from 7.81 per cent. to 3.50 per cent.

The price per square yard for eight-inch telford was 69¾ cents.

The total cost was \$20,045.74.

Mountain Road, 3.39 Miles Long.

This road begins at the old road, in the borough of North Caldwell, and extends along the top of the mountain and down its northern end to the Pompton turnpike. It is built of telford, five inches, and macadam, three inches thick, and is sixteen feet wide.



West Passaic ave., Essex Co., before improvement.



West Passaic ave., Essex Co., after improvement.

Throughout its entire length this road traverses a most picturesque country. The Pompton turnpike end was so very precipitous that it demanded more engineering skill for its location and grading than any other road under construction this year, the cuts and fills at this end exceeding twenty feet. In fact, the embankments resemble rather those of a railroad than of a highway.

This road will be used principally by the residents of the surrounding section as a pleasure drive, and will form a most important addition to the scenic drives of this portion of the State.

Richard C. McMains, Nutley, New Jersey, was the contractor.

The maximum grade was reduced from 16.97 per cent. to 9.40 per cent.

The cost per square yard for eight-inch telford was 57 cents.

The total cost was \$31,484.23.

GLOUCESTER COUNTY.

Glassboro and Hardingville Road, 5.18 Miles Long.

This road commences one-half mile southwest of Glassboro, and passes through Aurora to Hardingville and the Salem county line. It is built of gravel, fourteen feet wide and six inches thick. There are some fairly good gravel beds along the line of the road, which made the construction comparatively inexpensive. The soil over which this road passes is variegated, being in some places sandy, others sandy loam and still others a gravelly loam. There is some good grass, corn and truck land, and a portion heavy enough to raise wheat and potatoes.

The road is very sandy at the Salem county end, and lined mostly with old farm-houses. It is part of a through line running to Salem.

Joseph S. Fisler, Clayton, New Jersey, was the contractor.

The maximum grade was reduced from 3.2 per cent. to 1.8 per cent.

The price per cubic yard for gravel was 30 cents.

The total cost was \$10,505.32.

German Street, 559 Feet Long.

This street begins at the easterly edge of South Broad street, Woodbury, at its intersection with German street, and extends southeasterly along German street, in the city of Woodbury. It is built of macadam, sixteen feet wide and eight inches thick. This street merely forms a connection and is an extension of other roads.

The Delaware Granite and Mining Company was the contractor.

The maximum grade was and is 3 per cent.

The price per square yard for macadam was 73 cents.

The total cost was \$928.73.

Delaware Street, 1.67 Miles Long.

This street begins at Broad street, in the city of Woodbury, and extends westwardly to the Crown Point road. It is built of macadam, ten and sixteen feet wide and eight inches thick. It forms a connection and is an extension of the road built through the city of Woodbury.

The Delaware Granite and Mining Company was the contractor.

The maximum grade was reduced from 5.4 per cent. to 3.5 per cent.

The price per square yard for macadam was 73 cents.

The total cost was \$6,724.62.

MERCER COUNTY.

The Trenton and Allentown Turnpike, 3.65 Miles Long.

This road begins at the New York Division of the Pennsylvania railroad, and extends through Mercerville and Hamilton Square to the Camden and Amboy Division of the Pennsylvania railroad at Newtown. It was built in two sections, 2.52 miles last year and 3.65 miles this year; both sections, however, being paid for this year. It extends through a very fine and populous

farming country over a sandy loam soil. Several hundred dwellings are located along its line.

This road gives an outlet for the inhabitants of a large farming section to the markets of Trenton. It is built of macadam, fourteen feet wide and six inches thick.

J. E. Hillpot, Bound Brook, New Jersey, was the contractor for the first section; the Rocky Hill Construction Company, Rocky Hill, New Jersey, was the contractor for the second section.

The maximum grade on the first section was reduced from 3.1 per cent. to 2.1 per cent.; on the second section, from 4.9 per cent. to 2.6 per cent.

The price per contract, lump sum, for the first section was \$12,351.54.

The total cost of the first section was \$12,961.33.

The price per contract, lump sum, for the second section was \$22,301.76.

The total cost of the second section was \$23,123.59.

The total cost of the road was \$36,084.92.

Edinburgh, Dutch Neck and Princeton Road, 6.69 Miles Long.

This road begins at Edinburgh, and extends northerly through Dutch Neck and Princeton Junction to the Delaware and Raritan canal, near Princeton. It is built of macadam, fourteen feet wide and six inches thick, through one of, if not the finest, farming sections in Mercer county. It forms a much-needed outlet for the hay, grain and other farm products, for which this section is famous, to the markets of both Trenton and Princeton.

The Rocky Hill Construction Company, Rocky Hill, New Jersey, was the contractor.

The maximum grade was reduced from 7.4 per cent. to 5.16 per cent.

The cost per contract, lump sum, was \$38,275.

The total cost was \$43,227.97.

Hamilton Avenue and Dogtown Road, 3.03 Miles Long.

This road begins at Chambers street, in the city of Trenton, and extends to the White Horse and Mercerville road. It is constructed of macadam, twelve and fourteen feet wide, six and eight inches thick. It passes through a variety of country. Commencing in the city of Trenton, it extends through a fine and well-cultivated farming district, broken in a few places by wild and unimproved stretches and ending at the heavy clay-beds along the White Horse and Mercerville road. The soil varies from a sandy loam to a heavy clay. This road affords a much-needed means of access from the clay-pits to the potteries of Trenton, this clay being especially adapted for the manufacture of the varied products for which the potteries of Trenton are famous.

The Rocky Hill Construction Company, Rocky Hill, New Jersey, was the contractor.

The maximum grade was reduced from 3.8 per cent. to 1.5 per cent.

The cost per contract, lump sum, was \$27,069.41.

The total cost was \$28,070.09.

MIDDLESEX COUNTY.

New Market Road, 2 Miles Long.

This road begins at Campbell's Hill, and extends toward the New Market, Stelton road. It is constructed of macadam, twelve feet wide and eight inches thick. It extends through a good farming district, and gives the farmers of this section an outlet to the trunk lines that lead to the markets of Newark, New Brunswick, Perth Amboy and Trenton. It is one of a series of branch lines that we have been building this year as feeders to the trunk lines.

Clarence M. Liddle, Woodbridge, New Jersey, was the contractor.

The maximum grade was reduced from 5.50 per cent. to 3.75 per cent.

The cost per contract, lump sum, was \$8,798.63.

The total cost was \$9,622.80.

Hightstown and Manalapan Road, 2.53 Miles Long; 1 Mile Paid for Last Year; 1.53 Miles Paid for This Year.

This road begins at the Mercer county line, in the township of Monroe, and extends to the Monmouth county line. It is built of macadam, twelve feet wide and eight inches thick. This road passes through a good farming district, and is a part of the continuous line from Hightstown to Freehold, all of which is now built from Hightstown to Manalapan, from which point a gravel turnpike, formerly a toll road, extends to Freehold. It was necessary to construct this road in order to fill up the gap between Trenton and the seashore.

The Trenton Stone and Construction Company, Trenton, New Jersey, was the contractor.

The maximum grade was reduced from 4 to 2 per cent.

The price per contract, lump sum, for the entire road, was \$17,132.16.

The total cost was \$19,877.94.

South River Road, 1.26 Miles Long.

This road begins at the southwest end of South River causeway, and extends to Hardenburgh's Corner. It connects the road leading from South Amboy to South River with the road leading from Old Bridge to New Brunswick, making a continuously improved road from New Brunswick to South Amboy. It is built of macadam, twelve feet wide and eight inches thick. It passes over a sandy and sandy loam soil, and is valuable principally for being a connecting link between important roads.

Patrick J. Moran, New Brunswick, New Jersey, was the contractor.

The maximum grade was reduced from 6 per cent. to 4 per cent.

The cost per contract, lump sum, was \$4,966.52.

The total cost was \$6,549.03.

South Amboy and Keyport Road, 2.25 Miles Long.

This road commences at the railroad bridge west of Amboy and runs to Amboy, through the town along Main and Broad streets, or Stevens street; thence southwest, through a fairly-good farming country. It is constructed of macadam, twelve feet wide and eight inches thick. The soil over which it passes is a clay loam. The principal part of this road is through the town of Amboy. It is part of a through line from Amboy south, along the coast towards Long Branch, links of which are at present being built in Monmouth county.

C. Burton Smith, South River, New Jersey, was the contractor.

The maximum grade was reduced from 6 per cent. to 5 per cent.

The price per contract, lump sum, was \$9,224.24.

The total cost was \$10,427.94.

South Plainfield Road, 1.34 Miles Long.

This road extends from South Plainfield to the Union county line at Woodland avenue. It is constructed of macadam, twelve feet wide and eight inches thick. The soil is a sandy loam and is principally cultivated. It gives an outlet for the South Plainfield people to the Union county line. South Plainfield is a thriving village along the Lehigh Valley road.

Luther H. Tappen, Metuchen, New Jersey, was the contractor.

The maximum grade was reduced from $3\frac{1}{2}$ per cent. to $2\frac{1}{4}$ per cent.

The price per contract, lump sum, was \$4,995.04.

The total cost was \$5,913.88.



South Plainfield road, Middlesex Co., before improvement.



South Plainfield road, Middlesex Co., after improvement.



Cranbury and Pleasant Hill road, Middlesex Co., before improvement.



Cranbury and Pleasant Hill road, Middlesex Co., after improvement.

Dayton and Jamesburg Road, 2.95 Miles Long.

This road begins at Dayton, and extends to Tollman's Corner. It is constructed of gravel, twelve feet wide, six to ten inches thick. The soil over which it passes is sandy loam. There are several fine farms along its line.

This road will give an outlet for the farmers to the trunk line or Cranbury pike passing through Dayton.

Rue and Fountain, Old Bridge, New Jersey, were the contractors.

The maximum grade was reduced from $3\frac{1}{4}$ per cent. to $2\frac{1}{4}$ per cent.

The cost per contract, lump sum, was \$2,609.

The total cost was \$4,130.43.

Pleasant Hill and Cranbury Road, 2.32 Miles Long.

This road begins at Pleasant Hill, and extends to the hay scales at Cranbury. It is built of gravel, twelve feet wide, six to ten inches thick. The soil over which it passes is a well-cultivated, sandy loam. It forms a connection with the stone roads leading north and south to the markets of Trenton and New Brunswick.

Rue and Fountain, Old Bridge, New Jersey, were the contractors.

The maximum grade was reduced from 4 per cent. to 3 per cent.

The cost per contract, lump sum, was \$2,043.

The total cost was \$4,683.38.

Union Valley and Half-Acre Road, 1.30 Miles Long.

This road begins at Union Valley Church, and extends to Half-Acre. It is built of gravel, twelve feet wide, six and ten inches thick. The soil over which it passes is a sandy loam.

This road makes an outlet for the farmers to the improved roads leading north to New Brunswick and south to Trenton.

Rue and Fountain, Old Bridge, New Jersey, were the contractors.

The maximum grade was reduced from $5\frac{1}{2}$ per cent. to $3\frac{1}{2}$ per cent.

The cost per contract, lump sum, was \$1,015.

The total cost was \$1,959.64.

MONMOUTH COUNTY.

Keyport and Keansburg Road, 1.92 Miles Long.

This road begins at the easterly boundary line of Keyport, in the township of Raritan. One and one-half miles, in an easterly direction from Keyport, was built last year, the remaining portion, 1.92 miles, built this year. It is constructed of macadam, fourteen feet wide and eight inches thick. It passes through a sandy and sandy loam district. The land is principally used for trucking for the New York markets. This road is part of a continuous line that is being gradually built in the different counties along the New Jersey shore.

J. R. Shanley, Newark, New Jersey, was the contractor.

The maximum grade was reduced from 3.90 per cent. to 2.50 per cent.

The cost per contract, lump sum, was \$9,996.

The total cost was \$12,904.88.

Holmdel and Marlboro Road, 3.43 Miles Long.

This road begins at the cross-roads or streets in the village of Holmdel, and extends to the county road near Bradevelt. It is built of macadam, fourteen feet wide and six inches thick. It affords a fine outlet to the market station of Bradevelt from Pleasant Valley, one of the finest agricultural sections of the State. On account of the heavy fills and cuts, this has been a very expensive road to build, and has required two years for its construction.



Holmdel and Marlboro road, Monmouth Co., before improvement.



Holmdel and Marlboro road, Monmouth Co., after improvement.

The contractor for the grading was Daniel H. Taylor, Holmdel, New Jersey, and for the macadamizing, Charles R. LeCompte.

The maximum grade was reduced from 4.92 per cent. to 3.60 per cent.

The cost of the grading and underdraining was \$7,848.06.

The cost per contract, lump sum, for the macadamizing, was \$21,834.72.

The total cost of the road was \$29,986.42.

Squankum and Lakewood Road, 4.71 Miles Long.

This road begins at the Lower Squankum bridge, at the junction of the Lower Squankum and Turkey State road, and extends in a southerly direction to the Ocean county line at Lakewood. It is built of gravel, fourteen feet wide and eight inches thick. The soil is sandy. For a portion of the way the road is lined with a series of small farms; at other places it runs through a forest. It is intended more especially to give the wealthy winter resort of Lakewood a connection with the improved road system of Monmouth county. It is one of a series of roads that are being built in different directions out of Lakewood, one of the most remarkable and thriving winter resorts in the United States.

James H. Butcher, Ardena, New Jersey, was the contractor.

The maximum grade was reduced from 3.10 per cent. to 1.98 per cent.

The price per contract, lump sum, was \$9,700.

The total cost was \$10,558.85.

Red Bank and Oceanic Road, 3.19 Miles Long.

This road begins in the middle of Front street, in the town of Red Bank, and extends to the south end of Oceanic bridge, across the North Shrewsbury river. It is constructed of macadam, sixteen feet wide and eight inches thick. It passes over a sandy loam soil and by many residential sites.

This road affords a fine drive for the many pleasure-seekers that cluster around this whole section of country during the

summer season. It runs parallel with the Shrewsbury river and along it are many pretty residences, to the occupants of which the Shrewsbury river gives beautiful views, fine sailing, bathing and fishing. It forms an outlet for Atlantic Highlands to the more-improved sections in and around Red Bank, and gives the people access to the fine markets that exist in every direction in this highly-favored country.

The Rocky Hill Stone and Construction Company, Rocky Hill, New Jersey, was the contractor.

The maximum grade was reduced from 6.7 per cent. to 3.2 per cent.

The price per contract, lump sum, was \$21,579.84.

The total cost was \$22,460.84.

MORRIS COUNTY.

James Street, Morristown, 2.03 Miles Long.

This street commences at South street, in Morristown, and extends to the Passaic township line. It is built of macadam, twelve feet wide and six inches thick. The road passes handsome residences and fertile farms. The soil is clayey loam. There was but a small amount of grading.

John D. Smith, Rockaway, New Jersey, was the contractor.

The maximum grade was reduced from 7.2 per cent. to 3.1 per cent.

The price per square yard for macadam was 45½ cents.

The total cost was \$12,457.37.

Mount Freedom Road, or Newton Turnpike.

This road extends from Morristown west, principally through a mountainous, wild, picturesque country. The Randolph township section is 6.07 miles long, 2.46 miles of which were completed this year. It is built of macadam, twelve feet wide and six inches thick. The land is mostly covered with timber. The soil is a drift boulder, sandy loam and clay, underlaid with granite, which comes to the surface in many places, making very costly grading.



Newton turnpike, Randolph township, Morris Co., before improvement.



Newton turnpike, Randolph township, Till Hill, Morris Co., during improvement.



Passaic Valley road, Morris Co., before improvement



Passaic Valley road, Morris Co., after improvement.

When both sections of this road have been completed, it will form a direct outlet for the inhabitants of the beautiful valley of Succasunna, towards Morristown, which is now reached by a very roundabout way. Along its line are many picturesque residence sites; some, near Morristown, have been improved by wealthy New Yorkers. Now that this wild section has been made accessible by easy grades, no doubt many of the commanding locations will soon be crowned with beautiful residences and ornamental grounds. Much of this country becomes interesting and desirable when opened out by the macadam roads which are doing much to develop the picturesque parts of Morris county.

Much of the wildness of this section is produced by the semi-granite mountains that run north and south. This road is being carried through the passes of the mountains. The reduction of sixteen-foot grades to four and six feet overcomes the objections to this old stage route, bringing it back to its original position as the most traveled line from Morristown northwest, before neglected for the more circuitous route along the river grades. This section has no macadam roads, therefore demands attention, according to the terms in the State Aid Law requiring that all parts of the counties should receive the benefits of the State aid.

Milton J. Black, Rockaway, New Jersey, was the contractor.

The price per square yard for macadam, native rock, was 36 cents.

The maximum grade was reduced from 12 per cent. to 6.33 per cent.

The total cost was \$35,443.34.

Passaic Valley Road, 4.302 Miles Long.

This road begins at the Somerset county line, at Millington, and extends to the Union county line at Townley's bridge. It is constructed of macadam, twelve feet wide and six inches thick.

This road forms a continuation of the Union county stone-road system, and makes an outlet for the products of the Passaic valley to Elizabeth, the Oranges and Newark. It will be of especial advantage to the owners of the large meadows along the

Passaic river, giving them a long-needed outlet to the large hay-market of Newark. Nor is this its only advantage. It opens up a most beautiful and picturesque portion of the State to the dwellers in Elizabeth, Newark and Jersey City.

Dickerson and Gill, Rockaway, New Jersey, were the contractors.

The maximum grade was reduced from 10.1 per cent. to 5 per cent.

The price per square yard for six-inch macadam was 46 cents.

The total cost was \$37,424.81.

Hamburg Turnpike or Newfoundland Road, .587 Miles Long.

This road begins at Wise's bridge, Passaic county line, and extends to Cooper bridge, the dividing line between Passaic and Morris counties. It is constructed of macadam, twelve feet wide and six inches thick. It forms the connecting link between the two sections of the Paterson and Hamburg turnpike, lying in Passaic county, and, in fact, is the Morris county section of this turnpike. This road forms Morris county's contribution to the great through line across the northern portion of the State. It is hoped that the first decade of the twentieth century will see the completion of this improvement to the Delaware river. The Paterson and Hamburg Turnpike Company was incorporated at the beginning of the nineteenth century, and was opened by them through to the Delaware river. At that time it was considered one of the greatest improvements of that age. It is our aim to so improve this famous old turnpike that its early reputation may not be lost.

Colfax and Steele, Preakness, New Jersey, were the contractors.

The maximum grade was reduced from 8 per cent. to 4.33 per cent.

The cost per square yard for six-inch macadam was 45 cents.

The total cost was \$4,098.99.



Lakewood and Point Pleasant road, Ocean Co., after improvement.



Lakewood and Point Pleasant road, Ocean Co., after improvement.

Portion of Newark and Pompton Turnpike, .70 of a Mile Long.

This road begins at the intersection of the Paterson and Hamburg and the Newark and Pompton turnpikes, and extends southerly and easterly across Pompton Plains to the bridge over Pequannock river. It is constructed of macadam, twelve feet wide and six inches thick. This road forms the string of which the Paterson and Hamburg turnpike is the bow. It is built over a gently-undulating, nearly level plain, which forms part of the famous Pompton Plains. The soil of the country through which it passes was almost the first tilled in the interior of Northern New Jersey, and which, during the Revolutionary epoch formed one of the chief granaries of the struggling Continental army. Owing to the diversion of trade and commerce to other sections of the country, the people feel that their only safeguard against having their door-posts inscribed with the terrible legend Ichabod, is to be found in improving their highways.

Colfax and Steele, Pompton, New Jersey, were the contractors.

The maximum grade was reduced from 1.00 per cent. to 0.50 per cent.

The price per square yard for six-inch macadam was 34½ cents.

The total cost was \$3,178.50.

OCEAN COUNTY.

Lakewood Road, 7.60 Miles Long, the Second Section or 3.90 Miles of Which Were Completed This Year.

This road begins at West Point Pleasant, and extends to the easterly suburbs of Lakewood. It is built of gravel, sixteen feet wide, six and nine inches thick. It connects the noted winter resort of Lakewood with the summer seashore resort of Point Pleasant. It is built over a sandy and sandy loam soil, through a moderately, well-settled farming district. There are some small towns along the route. It forms an easy outlet from Lakewood for the automobiles and many fine teams that daily sally out of Lakewood.

This is one of a series of roads which are being built in every direction out of Lakewood to give the winter dwellers of this sanitarium pine resort easy access with the outside world. On one end it was built of gravel from the Lakewood gravel-pits, and on the easterly end from the Squankum gravel-pits. It was an expensive road to construct on account of the long distance which the gravel had to be carted.

James H. Butcher, Ardena, New Jersey, and J. H. Vanschoick, Squankum, New Jersey, were the contractors.

The maximum grade was reduced from 3.86 per cent. to 2 per cent.

The cost per contract, lump sum, was \$10,715.98.

The total cost to date is \$9,549.70.

PASSAIC COUNTY.

Hamburg Turnpike and Oakland Road, 1.70 Miles Long.

This road begins at the Paterson and Hamburg turnpike, near Garret P. VanRiper's, and extends in a northerly direction to the road to Oakland, in the township of Wayne. It is constructed of macadam, sixteen feet wide and four inches thick.

This road extends through a densely-wooded section for its entire length. Its main purpose is to form a short cut from the Hamburg turnpike to Oakland. The soil over which it is constructed is rough and clayey. The surface was quite hilly, therefore it was necessary to make several deep cuts along the line. By this means the grade was reduced from eight to four per cent.

Smith and Spear were the contractors.

The maximum grade was reduced from 8 per cent. to 4 per cent.

The price per square yard for four-inch macadam was 22 cents.

The total cost was \$9,585.47.

Laurel Street and Crosby Avenue, .57 Miles Long.

This road begins at Hamburg avenue, and extends to Ryerson avenue. It is built of macadam, sixteen feet wide and four inches thick. Two-thirds of this is well settled with a good class of houses, the remainder building lots. The street is located principally through a big sand-hill, so heavy it was scarcely possible for teams to get through it before it was macadamized. It helps a section of Paterson which is opening out for improvement.

The Preakness Crushing Company was the contractor.

The maximum grade was reduced from 8 per cent. to 5 per cent.

The price per square yard for macadam was 19 cents.

The total cost was \$1,586.35.

Naucktpunck Road, 3.50 Miles Long.

This road begins at the Hillery street bridge, and extends to the Singac road. It is constructed of macadam, sixteen feet wide and four inches thick.

This road might very appropriately be named Riverside drive, running as it does between the base of a steep bluff and the bank of the river. It is the most picturesque drive leading out of the city of Paterson, and will form, when completed, the most beautiful and park-like roadway in Passaic county. For its entire length it is bordered upon one side by forest trees and on the other by the waters of the Passaic river. Owing to its proximity to the river it was found necessary in several places to strengthen it by means of retaining walls to prevent the road-bed from being washed away.

William and Arthur Bunn, Little Falls, New Jersey, were the contractors.

The maximum grade was reduced from 9 per cent. to 6 per cent.

The price per square yard for four-inch macadam was 16½ cents.

The total cost was \$14,583.60.

Highland Avenue, .80 Miles Long.

This avenue begins at Main street, in the city of Passaic, and extends to the Boulevard. It is built of macadam, sixteen feet wide and four inches thick. The whole line is on the edge of the city of Passaic. It is a very pretty avenue, partly built up with a fine class of houses.

This road is located in a rapidly-developing portion of the city. It connects two important avenues extending out of the city of Passaic, and brings the whole city in connection with the depots of the D., L. & W. R. R. and the Erie road at Athenia.

Peter Bailey, Mountain View, New Jersey, was the contractor. The maximum grade was reduced from 8 per cent. to 4 per cent. The price per square yard for macadam was 23 cents. The total cost was \$3,463.28.

SALEM COUNTY.

Pedricktown Road, 2.18 Miles Long.

This road begins at the southwesterly end of the bridge over Oldman's creek (Nortonville), and extends southwesterly along the Bridgeport and Pennsgrove road, about 4,411 feet; thence southerly, over the Pedricktown road, about 7,096½ feet to the centre of the main street in Pedricktown. It is built of macadam, ten and fourteen feet wide and eight inches thick. The soil over which it passes is sandy and sandy loam, and about one thousand feet extends over a creek meadow banked in for farming purposes. There are some fine trucking farms along its route, where an immense amount of sweet potatoes, tomatoes and melons are raised for the New York and Philadelphia markets.

This road is a much-traveled route to the depot and trading towns, and is part of a through line between Salem and Philadelphia by the way of Bridgeport and Swedesboro.

The Delaware Granite and Mining Company was the contractor.

The maximum grade was reduced from 3 per cent. to 2 per cent.

The price per contract, lump sum, was \$13,038.60.

The total cost was \$13,038.60.



Pedricktown road, Salem Co., before improvement.



Pedricktown road, Salem Co., after improvement.

Salem and Hancock's Bridge Road, 1.07 Miles Long.

This road extends from Lower Alloway's creek to the city of Salem. It is constructed of oyster-shells, ten feet wide and twelve inches thick.

This road is the connecting link between the macadamized roads of the city of Salem and the oyster-shell road at Hancock's Bridge, making a through line from Hancock's Bridge to Salem. It extends through a well-settled country. The soil is light loam and covered with small farms.

Joseph Develin, Philadelphia, Pa., and B. M. Sweeten & Sons, Camden, New Jersey, were the contractors.

The maximum grade was reduced from 3 per cent. to 2 per cent.

The price per bushel for oyster shells was $3\frac{1}{4}$ cents.

The total cost was \$2,997.34.

SOMERSET COUNTY.

Skillman Road, 2.5 Miles Long.

This road begins at Blawenburgh, and extends to the Philadelphia and Reading railway crossing, with a branch extending westerly therefrom to the railway station at Skillman. It is built of rock, six inches thick, and macadam, four inches thick, and is twelve feet wide.

This road is situated midway between the Belle Mead and Hopewell stone roads, and affords an outlet for the farmers along its line to the railway station at Skillman. It is of still greater use for the officers and residents of the epileptic village. It converts what was, in the early winter and spring, an almost impassable slough into a smooth and easy means of ingress and egress to the inhabitants of the above-mentioned village.

When this road is extended northerly and southerly for a distance of about two miles in each direction, it will complete the through line from Morristown to Trenton, thus realizing Washington's dream in the dark days of the Revolution.

Richards & Gaston, Somerville, New Jersey, were the contractors.

The maximum grade was reduced from 11 per cent. to 8 per cent.

The cost per contract, lump sum, was \$12,012.30.

The total cost was \$15,248.16.

*Conover's Corner and Liberty School House Road, 3.38
Miles Long.*

This road begins at Conover's Corner, and extends to the bridge at Liberty School House. It is built of rock, six inches thick, and macadam, four inches thick, and is twelve feet wide. It forms a connecting link between the South Somerville and Belle Mead macadamized roads. It forms another link in the chain of good roads between Morristown and Trenton, and will make, when these links are all united, a portion of the chain connecting Carpenter's Point, the most northerly point in New Jersey, with the State Capitol. At present it affords easy and quick access for the farmers of the southern portion of Somerset county to their county seat.

Richards & Gaston, Somerville, New Jersey, were the contractors.

The maximum grade was reduced from $9\frac{1}{2}$ per cent. to 6 per cent.

The cost per contract, lump sum, was \$17,043.41.

The total cost was \$21,353.98.

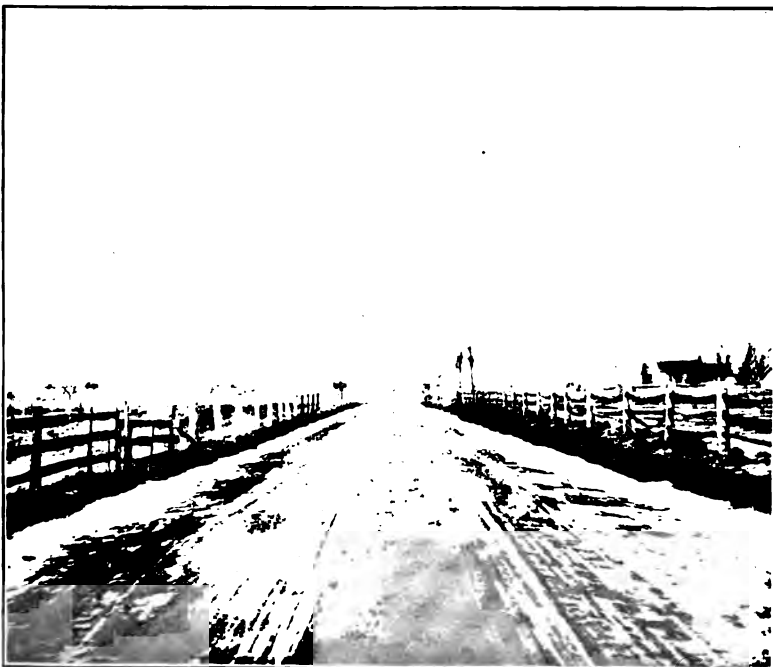
UNION COUNTY.

Union, Elizabeth and Orange Avenues, 1.178 Miles Long.

These avenues are situated in the town of Cranford, on the north side of the Central railroad of New Jersey. They begin at North avenue and extend to South Twelfth street. They are built of macadam, twelve feet wide and six inches thick, with macadam wings eight feet wide and four inches thick. They form an easy, convenient and, at all seasons of the year, a good road for the inhabitants thereof, giving them quick and easy access to the railroad. This is a township road.



Conover's Corner and Liberty School House road, Somerset Co., before improvement.



Conover's Corner and Liberty School House road, Somerset Co., after improvement

VanDeursen & Oliver, New Brunswick, New Jersey, were the contractors.

The maximum grade was reduced from 5.5 per cent. to 4.3 per cent.

The cost per contract, lump sum, was \$6,346.50.

The total cost was \$7,121.61.

Walnut Avenue, .963 Miles Long.

This avenue begins on the southerly side of the Central railroad of New Jersey, and extends southerly to the Lehigh Valley railroad. It is constructed of macadam, twelve feet wide and six inches thick, with macadam wings eight feet wide and four inches thick.

This avenue confers the same benefit upon the residents of that section of Cranford, lying south of the railroad, that Union, Elizabeth and Orange avenues do upon their neighbors on the northerly side of the Central railroad. This is a township road.

VanDeursen & Oliver, New Brunswick, New Jersey, were the contractors.

The maximum grade was and is 2.3 per cent.

The cost per contract, lump sum, was \$5,014.70.

The total cost was \$5,465.74.

WARREN COUNTY.

Continuation of Morris Turnpike, 6.33 Miles Long.

This road begins at the line dividing Washington and Franklin townships, and extends to the line dividing Greenwich and Lopatcong townships. It is built of macadam, fourteen feet wide and six inches thick.

This road extends through a very picturesque and rich farming country. The soil is mostly clay and sandy loam, formed largely from the decay of lime-stone ledges that crop out in every direction. The whole country is underlaid with lime-stone and yellow

shale from which several large mills along its line are manufacturing the finest quality of Portland cement. The great Edison Cement Works are located along this road.

Jerre B. Salmon and Herbert K. Salmon were the contractors.

The maximum grade was reduced from 10.8 per cent. to 8 per cent.

The price per square yard for macadam was 56½ cents.

The total cost was \$39,077.45.

Blairstown Road, 1.04 Miles Long.

This road begins at a point near the Paulin Kill, and extends to Woodpecker Point. It is built of macadam, fourteen, eighteen and thirty feet wide and six inches thick. This road gives the farming population along its line an easy course to the milk depots at Blairstown, this town being the shipping point for the large amount of produce raised in this section of the country. The main industry of the country is the raising of apples and milk.

Augustus Munson and Milton J. Black were the contractors.

The maximum grade was reduced from 10 per cent. to 5 per cent.

The cost per contract, lump sum, was \$8,571.07.

The total cost was \$8,695.30.

Washington Avenue, Belvidere Avenue and Broad Street, 1.422 Miles Long.

Washington avenue extends from the present pavement easterly and westerly to the borough line, a distance of 5,687 feet.

Belvidere avenue extends from the canal, northwest to the borough line, a distance of 920 feet.

Broad street extends from the D., L. & W. R. R. southeasterly to the borough line, a distance of 941 feet.

This road is built of macadam, sixteen feet wide and six inches thick. It is a township road, and is located principally within the beautiful borough of Washington. It connects with a sys-



Blairstown road, Warren Co., before improvement.



Blairstown road, Warren Co., after improvement.

tem of roads intended to extend in all directions from this borough, and eventually to connect easterly with the Morris county system now built to Schooley's Mountain, southerly with the Hunterdon county system, and northerly with the thriving towns on the Delaware river.

James C. Stanley, Little Falls, New Jersey, was the contractor.

The maximum grade was reduced from 9 per cent. to 5 per cent.

The price per square yard for macadam was 59 cents.

The total cost was \$9,698.68.

Road Improvement in New Jersey for the Year 1902.

The demand for improved roads is constantly increasing. Prompted by State aid, work on seventy-five different sections of our public highways has been commenced this year, aggregating two hundred and one miles, one hundred and fifty-five of which have been completed. The remaining mileage was not advanced far enough to command any portion of this year's appropriation.

The increase of the State's appropriation by the last Legislature from \$150,000 to \$250,000 has been promptly met by the different counties, but, although it has enabled them to largely augment their improvements, it falls far short of meeting the demands of the numerous petitions.

The counties of Atlantic, Bergen, Burlington, Camden, Cape May, Essex, Gloucester, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Salem, Somerset, Union and Warren are this year beneficiaries of the State's bounty. Citizens of Cumberland and Hunterdon have presented petitions to their respective Boards of Freeholders, but as yet have failed to secure recognition.

Upon many of our roads work has been very much delayed, owing to the following causes:

First, in many of the counties the freeholders think they have no authority to advertise for bids until after they make the appropriations at their annual meetings in May. Thus the commencement of road work is often delayed by the time required for the necessary preliminary work of surveys, advertising, arranging for the acceptance of bids, and for the contractors to bring their men and implements together. For these reasons four of the best road-building months of the year, March,

April, May and June, are eliminated, and construction is forced over to the hot months of July, August and September, when men are busy and teams are required in the harvest fields, pleasure resorts and various enterprises that are most active during the summer and early autumn months. The law regulating the appropriations and contracts of freeholders should be so amended that they can make contracts for the coming year at any time after the first of November preceding their annual meeting, and thus harmonize with the State's fiscal year, which ends on the last day of October. Then the greater portion of the work could be completed while there is the most business leisure and the best working weather.

Second, after the work this year had fairly commenced, the excessive rainfall, lasting over a long period, delayed progress for many days. Then labor became scarce, crushers could not be operated for want of coal consequent upon the strike, and the great demand for teams in other branches of industry retarded the work to such an extent that many of our roads were not completed, and therefore not in condition to claim a share of this year's appropriation.

The following is a condensed account of the progress of the work in the different counties in the State:

Atlantic county this year has commenced the construction of the Pleasantville and Atlantic City boulevard, 4 miles long, 60, 80 and 100 feet wide, connecting the city with the main land, the contract price of which is about \$83,000; also the Absecon and Chestnut Neck road, 11 miles long, connecting Atlantic City with the Burlington county system; likewise has completed the Hammonton and Pleasant Mills road, 8.11 miles, the Pleasantville and May's Landing road, 11.99 miles, and is contemplating many more. Those improved and under contract will give Atlantic City, upon the completion of the boulevard across the meadows, a continuous line of 75 miles of incomparable roads for automobile and carriage-driving, where before travelers were forced to wade through heavy beds of sand.

Bergen county receives its first installment of State aid this year. Under the Township State Aid Act, Hillsdale is claiming State aid for Railroad, Summit and Hillsdale avenues, aggregating 1.02 miles. Bergen possesses many miles of improved roads built several years ago by the different townships.

Burlington county still maintains its record for building all the roads that the law will allow, although it does not borrow to meet State aid, and further requires each township to grade, at its own expense, all roads improved within its borders. In expending one-fourth of one per centum of her ratables she thereby claims a large part of the State appropriation. This county has completed and started construction on the following roads:

Piper's Corner and Indian Mills, 4 miles; Burlington and Columbus, 6.98 miles; New Gretna, 5 miles; Medford and Red Lion, 4.49 miles; Mount Holly and Smithville, 3.21 miles. In addition to the foregoing the county has purchased its portion of two turnpikes, extending into its borders from Camden, namely, the Westfield turnpike, 5.30 miles, and the Marlton and Camden turnpike, 1.43 miles. Altogether this county has added 19.13 miles to her system of improved roads during the past year, making a total of 141.06 miles improved under the provisions of the State Aid Law.

Camden county, forming a grand thoroughfare between the agricultural lands of Southern New Jersey and the Philadelphia markets, must be continually improving and extending its hard and smooth roads. Those improved this year are the Clementon and Gibbsboro road, 2.63 miles; Stoy's Landing road, 1.42 miles; Sandy Lane road, 2.20 miles, and the River road, 3.21 miles, a total of 9.56 miles, with many others petitioned for. This county is now contemplating purchasing, under the State Aid Turnpike Law, six toll pikes, 40 miles long, that lead out of the city of Camden, south, east and north. When this is done there will be but few miles of toll-pikes left in the State.

Cape May county is rapidly awakening to the fact that good roads are necessary to its material advancement, this year completing Asbury avenue, 1.80 miles; also 12 miles of fine driveway from Cape May to Cape May Court House. Under the State Aid Turnpike Aid Law the Ocean City turnpike, extending 2.08 miles across the meadows, has been purchased, giving Ocean City a fine connection with the main land. The county has further contracted to improve three miles, extending across the meadows from Wildwood, a growing seaside resort, to the main land. Thus in one year, under the State Aid Law, contracts

have been made to connect four famous South Jersey seaside resorts with the main land by means of first-class roads.

Cumberland county still hangs in the balance, many of her citizens working for State aid, and will probably enter the list next year.

Essex county, although possessing over three hundred miles of improved roads, is clamorous for more, and has constructed Sandford street, 2.20 miles; West Passaic avenue, 1.09 miles; Mountain avenue, 3.39 miles; Ridge road, 2.04 miles, making a total of 8.723 miles. The apparently small mileage of this county is counter-balanced by the expensive grading through trap-rock ridges, over which many of the roads extend. The trunk lines of this county are nearly all improved, therefore short pieces, which serve either as feeders or connecting links, are the only roads within the county limits demanding improvement.

Gloucester county continues to add rapidly to its mileage, this year constructing the Glassboro and Hardingville road, 5.105 miles; German street, 559 feet; Delaware street, 1.67 miles, and the Clayton and Williamstown road, 5.96 miles; altogether 12.835 miles.

Hudson and Hunterdon counties are out of the list this year, but are preparing to enter before another year expires, Hudson having already approved of a road for next year's construction.

Mercer county is spending this year in road-building about \$125,000, constructing the Trenton and Allentown turnpike, 6.17 miles; Marshall's Corner and Woodsville road, 2.43 miles; Edinburg, Dutch Neck and Princeton road, 6.69 miles; Hamilton avenue and Dogtown road, 3.03 miles; a total of 18.32 miles, making the mileage of improved roads, 86.35. This county is urging its claims for many more miles of good roads leading toward the manufacturing and commercial city of Trenton.

Middlesex county was an applicant for twelve short pieces of roads, viz., Amboy and Keyport, 2.25 miles; New Brunswick and Bound Brook, 2.50 miles; Sayreville and South Amboy, 2.25 miles; South Plainfield, 1.34 miles; New Durham, 2 miles; Union Valley and Half-Acre, 1.30 miles; Morristown and Lawrence Harbor, 1.97 miles; Pleasant Hill and Cranbury, 2.32 miles; Dayton and Tallman's Corner, 2.95 miles, and South River, 1.26 miles; a total of 20.14 miles. These are in part

portions of trunk lines, and it is the intention of the Board of Freeholders to extend same each year, thereby connecting important towns, others to serve as feeders to the trunk lines already built.

Monmouth, another of our ambitious counties, has been working upon six different pieces of roads—the Lower Squankum and Lakewood, 4.71 miles; Keyport and Keansburg, 1.92 miles; Holmdel and Marlboro, 3.43 miles; Main street, Matawan, 1.50 miles; Red Bank and Oceanic, 3.19 miles; Ocean avenue, North Long Branch, 1.76 miles, and the extension of Navesink road, 2.32 miles; a total of 18.83 miles.

Morris county claimed State aid for five different roads—Passaic Valley, 4.30 miles; Randolph township section of the Newton turnpike road, 6.07 miles; James street, Morristown, 2.03 miles; Hamburg turnpike, .587 miles, and a portion of the Newark and Pompton turnpike, .70 miles; a total of 14.249 miles. In this county we have encountered some heavy and expensive grading, which might in a measure have been avoided if the location of the road had been changed.

Ocean county is building its first road, under the State Aid Law, from Lakewood to Point Pleasant, a distance of 7.60 miles. This will provide a fine thoroughfare for the inhabitants of the winter resort of Lakewood to all points of the upper shore. This county is also preparing to improve twelve miles of highway between Lakhurst and New Egypt.

Passaic, one of the counties that early enlisted in road improvement, now possesses over two hundred miles of macadam roads, and is this year claiming State aid for Squaw Brook road, 1.46 miles; Highland avenue, .81 miles; Nauchtpunk road, 3.50 miles; Hamburg turnpike and Oakland road, 1.70 miles; Paterson and Hamburg turnpike, 3.71 miles; Macopin road, 2.75 miles; Clove road, .88 miles; Laurel street and Crosby avenue, .57 miles; a total of 15.37 miles.

Salem county is coming to the fore in the construction of good roads, having this year constructed the Salem and Hancock Bridge road, 1.07 miles; Pedricktown road, 2.18 miles, and the Elmer and Alloway road, 3.87 miles, thus adding 7.12 miles of improved roads to this county's highways.

Somerset county, with many miles applied for, confines itself

to building not more than seven or eight miles each year; this year, Conover's Corner and Liberty School House road, 3.38 miles, and the Skillman road, 2.50 miles; a total of 5.88 miles, constitute Somerset's addition to its good road system.

Sussex, the last county to avail itself of the funds provided by the State for road improvement, is this year constructing three small, widely-separated sections of its public roads, viz., the Sussex and Newton road, 1.50 miles; Stanhope and Newton road, 1.50 miles; Sparta and Newton road, 1 mile; making a total of 4 miles.

Union county, with virtually all of its leading roads macadamized, has requested but little aid from the State. One of her towns, Cranford, claims State aid, under the Township Act, for the improvement of Union, Elizabeth, Orange and Walnut avenues, which extend through the town in a general southerly direction for a distance of 2.14 miles.

Warren county, realizing the advantages of road improvement within its borders, has pushed the work vigorously during the past year, having improved, under the provisions of the State Aid Law, the Blairstown road, 1.04 miles; continuation of Morris turnpike, 6.33 miles; Washington avenue, Belvidere avenue and Broad street, in Washington, 1.422 miles; a total of 8.792 miles.

Our law should be so amended that the Boards of Freeholders can easily and quickly establish new routes around, instead of being forced to improve those portions of the old roads which are laid out over high elevations. This subject demands special attention at this time, as road improvement is being pushed forward into the more mountainous sections of our State. The necessity for this amendment will become more and more evident as the work progresses. It will soon be evident to the most casual observer that the attempt to macadamize roads over very steep grades will be a waste of time, money and material, and that it will be impossible to maintain in a satisfactory condition the roads so constructed.

A REVISION OF THE STATE AID LAW.

The experience gained under the operation of the State Aid Law during the past seven years has demonstrated the necessity of rewriting the same, in order that its workings may become more efficient and the doubtful points (which the counselors of each county interpret differently) may be made so clear that "he who runs may read" as soon as he peruses the text.

Following are some of the anticipated amendments:

First. To grant freeholders authority to immediately take possession of land needed to widen the roadbed or to alter the original courses where badly laid out. Many of our roads are too narrow to grade properly. No road should be less than three rods in width; in some counties many of them are scarcely two rods wide; in many places the fences have encroached upon the roadbed and there are no records in existence defining their width; consequently, the property-holders claim to own the land to the line of their fences. Furthermore, as we are now approaching with our improvements the mountainous sections of the State, we find it too expensive to grade the hills; also that the macadam does not add to the value of the roadbed unless the ascent is decreased. The ascent now encountered on many of the roads is so great that but a small load can be carried over the hills; therefore, there is no necessity for macadamizing the remaining portion of the road unless a loaded team can carry its burden over the entire length without reduction. Many roads in the northern counties are laid out directly over the hills, when a slight detour would carry them around without lengthening the distance, for it is often no further around than over the mountain, but we always encounter the objections of one or more of the property-holders, which often prevents or delays the relaying of the road until the necessary authority is acquired. This proves the necessity of giving the freeholders power to take possession of land at once, and, when amicable arrangements cannot be made with the abutting property-owners, allow all proceedings for damages to be taken afterwards.

This action will save many thousands of dollars to the State and counties. Our expensive experience, during the past two

years, in reducing the grades of some of these hills, demonstrates the necessity for immediate action in this direction.

In order that the work upon our roads can be commenced early in the season and completed in time to receive the State's appropriation, and thus harmonize with the State's fiscal year, it will be necessary to give the freeholders power to make contracts between the first of November and their following annual meeting in May. In other words, to anticipate their annual May appropriations for roads. This would simply give them the power to make the contracts, and thus allow all the preliminary work to be done in the winter; so that when the season opens, either in March or April, the contractor would be able to commence work. Under the present condition it is seldom possible for him to commence until June or July, thus losing three or four months of the best working season of the year. By the plan suggested the majority of the roads can be completed on or before the first day of November, while under the old regime the work is often carried into the winter, thus preventing compliance with the State's regulation to prepare full reports by the last day of November, also materially injuring the character of the work, as the stone fragments do not properly unite in freezing and thawing weather.

The desire of the inhabitants of some of our counties to have their roads more rapidly improved has become so great that the tax of one-fourth of one per cent. upon their ratables, for road purposes, is not sufficient; therefore, many deem it wise that the freeholders should have power to make contracts to the amount of one-half of one per cent., and if they find this tax too burdensome, then, and in that case, they should have power to borrow on low-rate bonds to meet it.

Many are claiming that this generation should have the use of the roads and the following generation should help pay for them, because, being permanent improvements, they will also have the use of them. This brings us to the question of borrowing. Many of the counties want the law so altered that they will not be required to make the first payment on the bonds until six years shall have expired. They claim that with this proviso they will be able to borrow more advantageously, as investors will not loan at as low a rate, if payment on the principal im-

mediately begins. Long-time bonds, when well secured, always sell for the lowest rate of interest or the highest premium. In the law power should also be granted to the counties or townships to assume, under certain conditions, the payment of the ten per cent. for the peculiar benefits conferred. In those counties in which road improvements are generally distributed, it seems scarcely just to collect the ten per cent. First, because there is much expense entailed in the collecting, and second, as all parts of the county enjoy the benefits, it does not seem fair that a few residents along certain lines should pay more than their neighbors who use the roads as much or more than they do. At present there is but one argument for the retention of the ten per cent., and that is, if it were removed, the freeholders and the State Commissioner would be overwhelmed with applications.

There are some changes necessary to give the Commissioner the powers which are now only implied, but are essential to a more faithful execution of the law. The requirement that the Commissioner shall appoint as supervisors those petitioned for, destroys the power of selecting the most capable, as frequently very inferior persons will, when the improvement is contemplated, hurry around and solicit signatures to their petition, which the property-holders often have not the courage to refuse. In several cases we have had from four to six petitions for a supervisorship of the same road, each signed by many of the same property-holders, thus making the whole proceeding a farce. Then again, when talent has been developed and conscientious performance of duty displayed, we should have the power to select or continually employ the persons possessing these necessary qualifications. The State and county would be immensely benefited, thousands of dollars saved and better construction obtained. Many of our supervisors have scarcely time to learn the rudiments of road-building before their occupation is ended. For the best interests of the public a skillful supervisor should be selected, one who has been tried and not found wanting.

In the construction of our roads it often happens that many unforeseen expenses occur which could not be provided for; besides, the construction of certain roads requires one, two and three years. This makes it impossible to approve of the exact number of roads to consume the State's appropriation in any one

year, and it often happens that the cost exceeds the appropriation. In justice to the counties, the Commissioner should have power to carry certain roads over to be paid for out of the next year's appropriation. For the reasons just stated we have inserted a provision in the proposed law to meet this condition.

As it is absolutely necessary that the roads shall be kept in proper repair, after the State and county have invested their funds in improving the same, we think it proper that the new law should contain a provision granting the State Commissioner of Public Roads power to *mandamus* the freeholders whenever they neglect to repair roads built under the State Aid Law, and also to prescribe the rules and regulations by which said repairs shall be made, thus making the power to *mandamus* not only general but specific. The State should see that its money so generously granted to the counties should be properly conserved.

As there have been several amendments made to the State Aid Law passed in 1895, it has been thought wise to incorporate all these amendments in the body of the law we have rewritten, among them the following:

"The provisions of this act shall extend to the townships, towns, boroughs, villages or any municipality, and all proceedings conforming, as far as possible, to the proceedings authorized and directed by this act, the said governing body shall perform the same duties and have the same powers as by said act devolve upon the said boards of chosen freeholders, and townships may, by a majority of the voters of each township, appropriate sufficient moneys to pay the ten per cent. agreed upon by the property-holders for the peculiar benefits conferred;" also the amendment extending to the provisions of this act to "any road, street or section which constitutes the boundary line between two counties;" also to the purchase of turnpikes or toll roads.

The above amendments are the ones that seem to be necessary to insert in a rewritten law, in order that the money of the State may be more carefully spent and its interests more thoroughly subserved.

NATIONAL GOVERNMENT AID TO PUBLIC ROADS.

The United States Government has now irrevocably committed itself to the policy of devoting a large part of its surplus to the development of public utilities. It is each year spending millions of dollars dredging and deepening our water-ways, aiming to render them easily passable for our rapidly-growing foreign and domestic commerce.

Last winter the Government passed an irrigation bill, devoting millions of public funds toward watering, and thereby making fertile, large areas of the arid lands of our Western States and Territories.

The first great internal improvement inaugurated by this nation was the national pike, the act for the laying out of which was approved March 29th, 1806. The first thing done by our Government, when it took possession of Porto Rico, was to appropriate \$1,000,000 for the construction of good roads. Among the first and most continuous work of Governor Wood, in his administration of the affairs of Cuba, was the spending of millions of dollars in macadamizing the streets and roads of Cuba.

The National Government last year appropriated \$60,000,000 for the improvement of our rivers and harbors, and yet ninety-five per cent. of the commerce benefited thereby had to be hauled over the common wagon-roads first.

Congressman Otey, of Lynchburg, Virginia, introduced into the House of Representatives a bill providing for the appropriation from the Treasury of \$100,000,000 to be applied to the construction of roads in forty-five States and four Territories. He said: "I am in favor of the whole system of roads being placed under Government supervision, to be paid for out of the United States Treasury. Since I introduced this bill I am overwhelmed with letters, from all sections of the country, approving it and inquiring about it. It should become a continuing appropriation till good roads become a net-work over the land. Will anybody tell me why the United States Government should not construct good roads in the States and Territories? Is there any difference in thus applying public money and devoting the same to the improvement of rivers and harbors?"

Wherever governments have turned their attention to the building of hard roads, under the patronage of the State, great systems of improved roads have resulted, which have always added largely, not only to the convenience of the inhabitants, but to the general wealth of the public. In no way can our Government add so rapidly to the prosperity of the nation as by contributing of its surplus to the macadamizing of the leading highways of the settled portions of the country, and thus enable the present generation to save millions in transportation, and also make the sections already partially settled so desirable that the inhabitants thereof will not wish to leave them.

The history of the progress of nations is replete with great developments that have resulted from the bestowal of bounties for the stimulation of great industries. In the old world splendid highways extend for hundreds of miles between many centers of population. They are mainly there because the governments have liberally donated their revenues to the building and maintenance of these roads. There is not much hope of general road improvement in this country until the National Government, as in ancient Rome or modern France, becomes their foster mother. Therefore, would it not be wise for our National Government to offer to each State a portion of its rapidly-accumulating surplus for the hardening of the common roads, on the basis of helping those who help themselves? That is, for every one or two dollars expended by each State in this direction, the General Government should bestow one dollar? This matter of bestowing bounty has worked so well in practice in those States that pay to their counties one-third or one-half of the cost of the roads they decide to harden, and it has so stimulated improvement of all kinds, where communities have seen fit to embrace the proffered help, that the results, from a national standpoint, would be incalculably great.

This plan, if adopted, would in a few years give us a net-work of improved highways, connecting all our leading centers of commerce, over which would pass a far greater tonnage of merchandise than this or any other nation has ever known, thus adding so rapidly to our wealth that we would become at once the envy and admiration of all nations.

For the attainment of this end we should use our best endeavors, not only among our immediate friends and neighbors, but also with our representatives in the National Legislature.

TOLL ROADS.

There are but three counties in the State that possess toll roads. Nearly all of the numerous roads of this character that were in use when the State Aid Law came into existence, have become free wagon-roads. This has been accomplished by purchase, desertion, or forfeiture of charter from neglect to keep them up to the standard required by law.

The names and lengths of the toll roads in the different counties are as follows:

Atlantic County.

Atlantic City and Pleasantville, gravel, five miles.

It is reported that this road has been sold to a trolley company.

Burlington County.

Mount Holly and Jobstown, gravel, six miles.

Centreton and Hartford, gravel, four miles.

Mount Holly and Lumberton, gravel, two miles.

These roads are rapidly approaching such a condition that they will be voluntarily surrendered, as the toll collected is not sufficient to keep them in passable repair.

Camden County.

Camden and Westfield, stone, five and one-half miles.

Camden and Moorestown, stone, eight miles.

Camden and Marlton, stone, eight and one-half miles.

Camden and Haddonfield, stone, six miles.

Camden and Blackwood, gravel, eleven miles.

These roads diverge in different directions from the city of Camden to and through fertile and highly-cultivated farming districts. The toll exacted from the hundreds of heavily-loaded

truck teams that daily travel over them is a great tax upon the farms tributary to these lines.

The burden seems the more intolerable as there are now so many free, hard roads, built by State and county, to which the owners of these farms have heavily contributed by paying their share of the county taxes. Many who contributed to the improvement of these free roads cannot travel over them because their farms are along and tributary to the toll roads.

Therefore, I would earnestly recommend that the Legislature increase the road appropriation at least \$50,000, in order that these toll roads, under the State Aid Turnpike Act, can be quickly purchased by the State and county.

According to the report of the State Board of Taxation for the year 1901, real and personal property in the State has increased over \$27,000,000; during 1902, over \$35,000,000. These figures show that the State is not suffering in the least by its liberal contributions to the building of hard roads.

REVISED ROAD MAP FOR 1902.

We have revised the map that accompanied our eighth annual report for 1901 by adding all the roads improved in 1902, also the free stone and gravel roads built by municipalities and others along the coast; likewise the stone and gravel roads bought by the different counties during the year.

The map is further improved by strengthening all the lines of the common roads, making them so distinct and prominent that they can easily be traced in any portion of the State.

This map shows all the improved roads in the State, all the common wagon-roads, the turnpikes that have this year been made free roads, and many gravel roads that are in fine condition for rapid traveling. The improved free roads are marked in red and the toll roads are dotted in the same color.

The map presents at a glance the extent of road improvement in New Jersey, and gives the intending traveler an opportunity to select the best routes between any particular points.

By means of this owners of automobiles, bicycles and pleasure carriages can intelligently travel through any portion of our State.

Road Supervision.

BY

ROBERT A. MEEKER, STATE SUPERVISOR OF ROADS.

The State of New Jersey, having invested over one and one-quarter millions of dollars in improving eight hundred miles of roads within her borders, is, of necessity, becoming aroused to the importance of preserving these famous highways and of maintaining a hard, smooth and even surface upon them at all seasons of the year. In order that this may be done it is necessary that these roads should have constant and intelligent supervision. Our State Aid Law provides that "after the first roads shall have been constructed under this act in any county, it shall be the duty of the Board of Chosen Freeholders thereof to appoint a County Supervisor of Roads, who shall hold his office for three years, and until his successor is appointed." Before making this appointment they should specify and determine his duties, to the end that they may obtain the man best fitted to discharge same. No one would think of hiring a blacksmith to repair a watch, or a man who had never stepped on the running-board to run a locomotive, yet the care and maintenance of roads costing \$50,000 is often intrusted to a man who frankly admits that those under his supervision are the first that he has ever had anything to do with. This is not as it should be.

Road-making and maintenance is a trade just as much as blacksmithing or watchmaking. Any one can heat a piece of steel, but how many can temper it? Any one can take a watch apart, but how many can put it together again? Therefore, it seems necessary that the duties and qualifications of road supervisors should be stated.

First. They should be men accustomed to outdoor work, and should know what a day's work for a man, with a pick and shovel, is.

Second. They should be able to take measurements and estimate the quantity of material required for a given piece of work. For this purpose they should always carry a memorandum-book, tape-measure, and two-foot rule with them. They should always enter on the spot, with the date, a clear and distinct measurement of any work or materials which are to be paid for by measurement; this will be found to be of great use in case of dispute.

Third. They must keep an accurate account of the materials spread upon each mile of road. Statements of the quantities of materials received and the amount spread and on hand should be prepared every three months.

Fourth. They should keep an accurate account of the tools, machines and other property belonging to their department, showing where and in whose charge they are, and a statement of this account should be made annually.

Fifth. They should make annual estimates of the cost of road maintenances in detail, showing the number of tons, price per ton and the total cost of road materials, the cost of labor and any miscellaneous expenditures that may be required beyond the ordinary maintenance for every mile of road.

Sixth. They should be good judges of the quality of road material available, and thus be able to select the best. A good road material should be hard, tough and not affected by weather.

Seventh. They should know when and how to apply the new material so as to obtain the best results. Generally speaking, the best time to do repair work is in the fall and spring. The metal placed upon a road during the dry, summer season is largely wasted.

Eighth. They should fully realize the necessity and importance of drainage. To this end they must keep all ditches, culverts and gutters free from all obstruction, in order that the water may be carried away from the road as quickly as possible; indeed, other care is almost thrown away upon a road the drainage of which is neglected. Drainage almost always requires attention, and there is generally a good deal that can be done to improve it at slight expense, and nothing pays so well in the end.

Proper care of the surface is generally all that is needed to prevent the water from standing on the top of the road, but a dry surface is not enough. On a flat, water may often be seen standing in the side ditches up to within a few inches of the surface of the road, in which case both the sub-soil and the road-covering must be softened by the soaking in of the water, and remain so long after the water has disappeared. A deeper ditch, a larger or a new culvert, or a drain cut through adjoining land is generally sufficient to remove a cause of great mischief.

These are a few of the important things that competent supervisors must see, know and do. Failing in them, their labor is vain and their time is spent for naught.

THE GREATEST ENEMY OF PERMANENT ROAD IMPROVEMENT.

BY R. A. MEEKER.

There is one element whose effect upon our roads has not been recognized, and hence has not received proper attention—it is water.

The old idea was to build roads with such a high crown that they would soon shed the water from the center to the sides, thus enabling the roads to take care of themselves. The result was, all of the travel was forced into the center, and an eight-inch road was worn down to a thickness of two or three inches in the center before it became so flat that it would not shed the greater portion of the water falling upon it into the gutters on the sides. The quantity of water remaining in ruts and small depressions upon the surface of the road was looked upon as a necessary evil, the new condition of the road being so far superior to that existing prior to the improvement that these minor defects were considered to be too small to require any attention. Experience is fast teaching us that this apparently insignificant amount of water has done and is doing great damage to our roads.

It is becoming more fully recognized that water is one of the principal causes, not only of injury, but also of wear to our roads.

Water softens the surface of the road, being absorbed not only by the detritus which forms the binder, but also by the stone itself. This is a fact so well known that it might be cited as an axiom, that water alone can wear away the hardest stone. When it is aided by friction and percussion, the disintegration of the stone is much more rapid. The result of this wear and disintegration is an uneven pavement, which presents elevations and depressions that increase and multiply the wear of the road-covering. The holes become deeper, the resistance to traffic greater, consequently the friction and wear increase and the life of the road is greatly shortened.

Hence, water is the greatest enemy we have to contend with. It attacks our roads from above in the form of rain, hail and snow, from beneath as water, frost and ice, and from the sides under its various forms due to temperature.

The water falling upon the surface softens the road-covering, reducing it to a condition commonly known as mud. This, if left upon the road retains the moisture, softens the stone and hastens destruction and wear.

The water penetrating the road from below does great and expensive damage before its presence is recognized. In the form of water it softens or washes away the earth forming the true foundation of the road, and the first intimation we have of its presence is the rutting or breaking up of portions of the road. In the form of frost and ice it heaves and breaks the surface as badly as a charge of blasting powder. These attacks of water from below are the most expensive and serious of any that we have had to fortify ourselves against, because they require the digging up of the entire road-covering and the removal of all water-soaked material, also the cutting off of all waterflow from the foundation by means of drains or ditches.

The water coming upon the road from the sides does much damage, flowing over and keeping the surface wet, also washing and gullyng the road.

From the foregoing it is readily seen that water is the great element of destruction against which we must continually war in order to preserve our roads from rapid disintegration.

THE REPAIR SYSTEM OF THE ROADS OF ESSEX COUNTY.

BY JAMES OWEN, COUNTY ENGINEER.

In 1902 there were ninety-four miles of telford roads in Essex county, under the supervision of the board of freeholders. Of these ninety-four miles, about forty were constructed by the original Essex Public Road act, and the remainder under the State Aid act. The system of repairs, however, does not individualize any original construction, and the repair account includes the whole mileage.

The repairs are in charge of the road committee of the board of freeholders, through their chairman, who is also county supervisor, and the roads are under the immediate supervision of twenty-two supervisors, or about four and one-half miles to each. The scale of wages paid is as follows:

Supervisor	\$2.50 per day.
Horse, cart and man.....	3.00 "
Team, wagon and man.....	4.50 "
Labor	1.50 "
Stone spreaders	1.75 "

The cost of broken stone, one and one-half inch and screenings, range from \$1.12 to \$1.72 per ton of two thousand pounds, according to location and length of haul.

Each supervisor has immediate charge of his particular section, and the responsibility is vested with him for proper and complete maintenance. The annual appropriation for road maintenance is \$45,000, expended approximately as follows:

Broken stone, including hauling.....	\$25,000 00
Spreading and rolling.....	9,000 00
Repairs outside of pavement.....	6,000 00
Permanent guttering	5,000 00
Total	\$45,000 00

Assuming forty miles of pavement to be twenty feet wide, and fifty-four miles to be sixteen feet wide, the actual cost of repairs to pavement is three and five-tenths cents per square yard per annum.

The condition of the roads at the present time may be considered ideal. Not a section in the whole ninety-four miles can be considered in any way open to criticism. In the Essex county system there is quite a mileage in the city of Newark, and these are main avenues, subject to heavy travel, and they require constant renewals—on some streets a coating of stone has to be placed every year. The principle of repairs is not one of patching, but one of renewals. In the spring of the year proposals are received for broken stone per ton, delivered on the different sections requiring renewal, and are spread by the county employes, and rolled and packed with either steam or horse rollers. If, in those sections that are not renewed, incidental patching has to be done, it is attended to, but the object is to have the top coating of all pavements wear uniformly and then be renewed. There are rarely any ruts, as all the Essex county pavements are constructed on the telford plan.

About five thousand dollars are expended annually in guttering the roads on steep grades. This is found to be economical in the end in saving continuous repairs.

In the spring of the year, when the winds sweep the pavements bare, stone screenings are placed on the steep grades, and a thin layer of clay or loam is spread where there is a tendency to ravel.

Essex county is fortunate in having a chairman of the road committee, Mr. Ougheltree, who is able to devote his whole time to the work, and the condition of the roads show the result of his constant attention.

MANNER OF SURVEYING ROADS.

BY JOSHUA DOUGHTY, COUNTY ENGINEER OF SOMERSET.

As I have in previous reports communicated my ideas of road materials and road construction, I will now give some outline of road surveys at least as conducted in Somerset county

The improvement of a certain road having been authorized, our surveys are next in order, and I find right here that line surveys of roads cannot be made too carefully. For this purpose we consult in advance the records of roads and occasional deeds for adjacent lands, but sometimes with little profit, for we find a road one hundred years old or upwards described as beginning at a gate-post and running along Mr. Smith's place, to a point opposite Mr. Jones' well, thence past the turnip patch, towards Mr. Brown's locust tree, and so on to a terminus at a point near the stone quarry. Generally, however, quite tangible information may be secured from the records in the county offices, satisfactory enough to aid us materially. One advantage in establishing from the records the middle line of the road is that we can then secure our full width on either side, settling boundary disputes between adjoining property-owners and the public. As to the work in detail, we then proceed as follows:

Beginning at one end of the road, at station zero, the whole distance is carefully measured by steel tape one hundred feet long, and stations taken every one hundred feet, with intermediates at fifty, twenty-five or even less feet, especially where there is a change of direction or in levels. These changes in directions are accurately measured by transit, both on the compass and on the vernier, and results entered in the book kept for such purpose; beginning at the bottom of the page and working upward and away from the person so as to correspond with the actual directions of the ground. The distances measured are continuous from beginning to end, and stakes are driven every one hundred feet, or less, at one side of the road, on a sixteen-foot offset for a thirty-foot roadway, and marked accordingly; thus a stake thirty-seven hundred feet from beginning would be number thirty-seven; one,

thirty-seven hundred and sixty feet would be thirty-seven plus sixty, and so on.

Places and objects of importance, like intersecting roads, streams, property lines, culverts, houses, drains, buildings and the like, are located accordingly, as well as the size, character and condition of culverts, their capacity, &c., and approaches, and their nature, the object being to secure information for a finished map, profiles and suitable cross-sections for future use.

Meanwhile, names of property-owners, boundary lines, frontage, acreage and the like are secured from residents, from county records and from other available sources. Too much information cannot be obtained, for, although not all of it may be used for subsequent maps, it is nevertheless valuable in note form for reference and for assessment purposes.

This done, levels are taken upon cross-sections opposite stakes already driven. If a cross-section is uneven or irregular, two, three or more levels are taken on each side of the axis of the road so as to obtain a tolerably correct outline of such section. Generally one or two such levels on each side are sufficient, particularly if there are no side banks or where they are of about the same height and form. Bench-marks are established at frequent intervals upon permanent points, such as abutments of bridges, neighboring rocks, nails driven into trees and posts, stone steps, &c., for use in subsequent construction, and, where possible, these bench-marks are checked with such as are found in our State geological reports, and with the government marks, mean tide at Sandy Hook being taken as the datum or zero.

After the line has been run and the levels have been taken, the line is plotted (usually on a scale of one inch to three hundred feet), traced and blue-printed with care, and the levels plotted on profile paper to a distorted scale, grades established, showing heights at beginning and end with rate per cent. for each, and the whole likewise blue-printed for inspection and examination by contractors and others interested, profile papers being too thin and frail to well withstand repeated handling. In establishing grades, we respect, as far as possible, the wishes of neighboring property-owners who are to be assessed, without interfering with the rights of the traveling public. The haul must also be taken into consideration.

The cross-sections, or a large number of them, are then plotted to an exaggerated scale, usually upon regular cross-section sheets, the grade of the middle line shown upon each, and an outline of the finished cross-section delineated by card-board template, showing also the excavation for the sub-trench for the stone, which is ordinarily twelve feet in width and eight deep, depending upon the thickness of the stone foundation.

Next, these cross-sectional areas are carefully computed by mean planimeter measurements, showing cuts and fills, in square feet, at each station, and the same are then marked thereon. Afterwards, the volume in cubic yards is ascertained by multiplying the average end areas by the distance and dividing by twenty-seven.

The prismoidal formula for volumes I consider an unnecessary refinement in such cases as we have.

Results are finally tabulated showing the cut and fill for each interval of one hundred feet, or less, and their summation will, of course, give the total cuts and fills for the whole road.

All this may entail some expense for which, however, full compensation and satisfaction are obtained from the fact that contractors, bidders and officials may rely implicitly on such results, and may bid and entertain bids intelligently and with confidence. Objections to quantities so computed have never been raised by any person during my term of seven years as county engineer.

Should any method of approximation be resorted to, contractors would be in better position to demand "extras" beyond the estimate or "guess," and I find reasonable precision most economical in the long run.

This completes our work and the information so secured is then embodied in the specifications for bidders' use.

No rules for surveys have, so far as I am aware, been as yet prescribed by our authorities, but I am persuaded that surveys should be made with as much accuracy as time and circumstances would permit. Hilly and mountainous sections, with frequent turns in roads and changes in grades, obviously demand closer work than sections more level in surface. Hasty surveys and "estimates" with consequent erroneous results should be scrupulously avoided.

ROAD BUILDING IN CUBA.

BY C. E. M'DOWELL.

The Army of Intervention in Cuba received from the revenues of the island \$57,000,000, and spent \$55,500,000 in its administration of affairs and improvements made, leaving in the hands of the new Republic on May 20th, 1902, \$1,500,000 in its treasury to start business with.

All of these accounts were audited and found correct to a penny, and not a bill that had been approved or a salary due an employe was unpaid on May 19th.

For all uncompleted work under contract, the money was appropriated and laid aside to pay for same. History cannot point to an equal for fidelity to trust, under similar conditions, anywhere. It will take time to write the history of Cuba under peculiar and trying conditions. It has been my pleasure to be on the ground in Havana the past three years, representing Jersey-men and New Jersey interests, and to come in daily contact with the officers and employes of the government.

In the city of Havana the government was the contractor, and bought all material and completed the work. The custom house at Havana, to a large extent, is the source of revenue of the island. The ports of Santiago, Matanzas, Cienfuegos and others do not begin to fill the demand made upon them for the care and improvement of their cities and immediate localities.

The money coming in at Havana was used first in Havana, and the balance to help all the island. All of the appropriation was made by General Wood himself, and there never was a time that he could not tell, within a day, the condition of every improvement, cost to date, cost to complete and where the money was to come from to pay for it.

When you consider that the revenue was used all over an island seven hundred miles long by thirty to one hundred miles wide for new highways, repairing highways, bridges, public schools, official buildings, new and old, sanitation or sewerage in the cities, hos-



Vapor st., Havana, Cuba, 1900, before improvement.



Vapor st., Havana, Cuba, 1900, after improvement.

pitals, prisons, insane asylums, and all that goes to make us a government of 1,500,000 people scattered all over this vast area, and that it meant the undoing of centuries of Spanish misrule, we can begin to understand the immense task placed before our government when entering the city of Havana.

HONESTY IN FULFILLMENT.

To spend this amount of money honestly, to achieve results and show completed work that would stand criticism for all time, was a large undertaking.

Its fulfillment is best described by a remark made by a prominent Cuban to a United States official there: "Your country has done more for Cuba in a year than the Spanish did in a century." This money was spent largely, as has been said, for street improvements and highways in the outlying districts, but it covered the expenditure of many other things, such as street cleaning, sewerage and sanitation—that the epidemics of yellow fever and small-pox might be things of the past—the forming of the police in the city and country, the renovating of schools and new school-houses, the improvement of hospitals and prisons, so that they were a credit and not a reproach—many of these things had been accomplished and many were still under way when General Wood left on May 20th.

The new Cuban government started out with clean cities, public buildings and schools, good pavements and thoroughly organized systems everywhere that go to make up a modern American city, as far as it could be applied in a tropical country. At that date we left in Havana a city as clean as New York, in a climate not excelled anywhere on earth, and a natural position, which, with the beautiful country all around, made it an ideal country, and one that should attract tourists from all parts of the world. All that is now lacking is the appreciation on the part of Cuba of what the United States has done for her and will do for the asking.

IMPROVEMENTS MADE.

While all these improvements were completed or under way on Evacuation day, in all parts of the island, naturally the largest expenditures were made in Havana, its largest city and principal port of entry.

THE CITY OF HAVANA.

Havana, with its suburbs, is a city of 300,000 inhabitants. It is shaped like a fan, the bottom of the handle being at the foot of the Prado, the principal street of the city, spreading out to the right to the suburbs of Vedado along the Gulf of Mexico, there turning to the left to the hills of Principe, with its lofty castle and fort; then Cerro Heights, with its beautiful homes and gardens; then Jesus Del Monte, the healthiest part of Havana, on high ground overlooking the city, the great resort in the summer for people from the crowded city below; again across the bay of Havana to the suburbs of Regla Guanabacoa, and the hills beyond.

STREETS OF HAVANA.

In the principal city are one hundred and twenty-five miles of streets and highways. Of this, some twenty-five miles are paved with Belgian block or granite of various kinds and sizes, and the balance of so-called macadam, or ordinary dirt roads. During the reign of the Spaniards their watchword was for revenue only, and that revenue for those who, for the time being, were in power.

When the Army of Intervention came, it found a demoralized city, sanitation and sewerage a thing in name only, streets worn out and utterly neglected, although appropriations for repairs had been regularly made. To remedy these conditions quickly required a clear head and a strong hand. In all tropical countries the native says "manana" (to-morrow); the American says "to-day" and "at once." The natives were impressed in the service and paid in a coin they had never seen before—the American dollar—worth its face anywhere in the world. Many things had to be done—the Spanish soldiers were sent home, police were organized, sanitation and sewerage corps systematically gotten together.

STREET IMPROVEMENTS.

Belgian Blocks and Granite.

The Belgian blocks came largely from Bergen Hill, Weehawken and Guttenberg, in our own State. They were furnished by a Jerseyman then, as now, engaged in business in Newark, who also furnished many miles of bluestone for curbing and sidewalks. Other Belgian blocks and granite, both large and small, came in merchant steamers as ballast from Belgium, Gran and Spain. The heavy travel they have been subjected to these many years has worn them smooth as glass, and full of holes. It is not an unusual sight to see twenty-five or thirty mules fall on these roads in one day.

Contract for Paving and Sewering the City Held by a New Jersey Company.

In the contract made last October for paving and sewerage by the city of Havana with a New Jersey company, amounting to \$11,000,000, it was stipulated that these old Belgian and granite blocks are to be removed, crushed and used on the outside streets until the main contract gets to them. This insures the macadamizing of a large part of the city with New Jersey trap-rock. This contract is one of the largest of its kind ever made. It is protected by the proclamation of President Roosevelt in convening the new Congress in the Republic of Cuba.

It is very complete in all its parts, and will take five years to finish. When complete, Havana should be one of the healthiest cities in the world, and free from epidemics of yellow fever and small-pox forever.

CONDITIONS OF THE STREETS.

As the large contract was let a year ago, many of the streets have been very much neglected, as it had anticipated the macadamizing spoken of. When complete, they are all to be of asphalt, brick and granite. During General Wood's administra-

tion sample streets were laid of all these, as well as of Medina sandstone blocks, and all tested thoroughly. In all cases the asphalt and asphalt blocks have been a failure. The sun and rains of the tropical climate softens and rots them, and the wear and tear is too great.

The vitrified blocks have had a varying degree of success and failure. Some are complete failures, others partially successful only. The Havana Electric Railway Company, in relaying its tracks with a modern Trilby steel rail, paved all between its tracks with vitrified brick on a concrete bed, much of the cement used coming from New Jersey. They used many millions of brick. Of these some 2,500,000 were furnished by a manufacturer of South River, New Jersey, and proved very satisfactory under trying conditions.

CONDITIONS OF TRAVEL.

It is doubtful if there is another place where the conditions of travel are worse than in Havana. The streets are narrow, particularly in the old city, and those on the outside are mere by-ways. It is not an unusual sight to see a load of four to six tons coming in or going out of the city on a two-wheeled cart with three-inch tires, drawn by six to ten mules, driven tandem. There are many hills in Havana, and the usual manner of braking is to zigzag. The result is a grinding process on the pavement that nothing less than iron can stand.

As the material used is a limestone, it is soon ground to pieces, and blown or washed away. They soon are six to twelve inches out of grade, and when neglected are almost impassable, particularly in the rainy season. This was the condition of the streets when the Army of Intervention came.

MACADAM ROADS.

In the city and all around Havana is found a coral limestone, fairly hard, but in no manner equaling the limestone from the Hudson river. This was the only material at hand to repair the streets with, and it was very inferior and very unsatisfactory.

With General Wood's entry into power he sought at once a better material. Being familiar with the New Jersey trap-rock, his thoughts naturally turned that way, for he appreciated that it had no equal anywhere as a road metal. A close examination as to its cost then precluded its use for the time being, although afterwards he used a large quantity. At the time the writer had called to the attention of General Wood a very hard stone of the nature of trap, found at *Maríel*, some twenty miles from Havana, westward along the Gulf of Mexico. At the General's request, a trip of inspection was made on a government tug furnished by him. The stone was found some distance from the shore. A thorough examination of the quarry and surrounding country was made. Here were found breastworks of the Spanish soldiers in the last war, for this country was overrun by the cavalry of both armies, each in turn sweeping over the ground and levying tribute on all for both provisions and money. The larger part of these breastworks had been removed to the city of Havana and there broken by hand, then used for repairs of streets. Loose stone and stone from the quarry were then being used to repair a highway running from Guanajay to Bahia Honda. This road had been built by the Spanish engineers, was a source of great pride to them and one of the few kept in order. It was some thirty miles long, and very extensively used by the great sugar and tobacco producing part of Cuba. This highway reached far out to the westward in the province of Pinar Del Rio. This stone is very similar to the trap-rock found in New Jersey along the Delaware river. The elevation of the quarry above tide-water and distance from transportation made it impossible to bring to Havana, and it was so reported. We were then told to hunt elsewhere, as a high-grade stone must be found. While searching for this my attention was called to a sample of syenite or bastard granite that had been taken from an abandoned asphalt mine near Campo, Florida, some twenty miles from Havana, on the lines of the United Railways of Havana. Here, in the center of a plantation of fifteen hundred acres, containing some of the best sugar lands in Cuba, a quarry had been opened for land asphalt. The asphalt was found, but not in paying quantities, and had to be given up. On examination, about ten feet of hard rock was found. Upon this prospect, orders were given to open a quarry and equip it with modern American crush-

ing machinery. A company was organized in New York, with a Jerseyman at its head, and a Jerseyman put in charge of the quarry. A stone-crushing plant, with a capacity of three hundred tons daily, was erected, and quarry and plant began to break stone about a year ago. Up to July 1st of the present year it was in full operation, and can be started up now on forty-eight hours' notice. The opening of the Cuban Republic, and the leaving of the Army of Intervention stopped operations.

The last six months of General Wood's stay in Havana were busy ones. Everything possible had to be accomplished and left for all time as object lessons. Nor was better work done anywhere by the United States army engineers than was done in Havana during these last days. The results were seen and appreciated by all intelligent citizens. Among these improvements were the rebuilding and completion of the Prado, the making of Punta Park, the Parks of the Palms, Gulf Avenue Boulevard and the sea wall. The boulevard is to be connected at a later date with another boulevard along the Gulf of Mexico, leading to the suburbs of Vedado. Camp Columbia (the quarters of the seventh cavalry), Owmados, (General Lee's old headquarters) and Mariana beach, making a twenty-mile circuit, and one of the finest drives in the world.

YUCATAN.

Four hundred miles west from Havana, Cuba, along the Gulf of Mexico, and fifteen hundred miles from New York, lies the Port of Progreso, the principal entrance to the State of Yucatan, and the third largest in the Republic of Mexico. Through this port comes everything used in this great peninsula, from Mobile, Galveston and New Orleans, as well as from New York, Philadelphia and Boston, from Tampico, Vera Cruz and all Mexican coast points. Through this port are shipped to the United States an average of 50,000 bales of sisal, valued in New York at \$20,-000,000 for a year's output. This sisal makes our binder twine, of which it is said that 100,000 tons are used yearly in the United States. The sisal plant (or henequen in Spanish) is a species of cactus, and the cultivation and utilization of it has made Yucatan one of the most prosperous countries on the earth. There is



Public road in Yucatan.

no idleness or poverty here; all are busy, happy and contented. Peopled by a race of Indians, the latter have been brought up to a life of industry and labor, and so are content. American mechanics as well as capitalists are welcome to the country, all joining in the prosperity and aiding to modernize and build up its industries.

Twenty-five miles south of Progreso is the city of Merida, the capital of Yucatan, founded in 1542. Leaving Progreso at mid-day, and seated in a Pullman car drawn by an American locomotive, made in Paterson, we are soon at our destination. Many strange things pass before our eyes as we enter this city of 60,000 people, with a history of centuries. On all sides are seen buildings from one hundred to three hundred years old, stained and weather beaten—all adobe. The city lacks only good pavements, sidewalks and a sewerage system to make it comfortable as a modern habitation. In these countries it rains nearly every day for five months of the year. To carry off the surface water was the problem. The whole city is underlaid with a flowing river from three to six feet deep. The river is found everywhere at a depth of from thirty-two to thirty-four feet. The order has gone out for general improvements, and a special tax is and will be levied on each bale of hemp leaving the country to provide for the payment. Contracts amounting to over \$300,000 have already been let for rock asphalt and vitrified brick pavement, cement curbs and sidewalks and wells to carry off the drainage. This work is to be followed by similar contracts until all is completed. The iron castings for well heads and covers have already gone from Newark.

In addition to work of this nature, a new driving park is planned, in which it is proposed to use New Jersey trap-rock. It is recognized there that our trap-rock makes the finest driving roads in the world, although it costs five times what it does at home. What this may lead to in the future as to the use of trap it is hard to tell. Conditions of travel there make it an ideal pavement, for the wear and tear is very light, and it is likely that a considerable amount will be used. While all of these street improvements and new parks are under way, there is also a great desire for concrete buildings of American design and construction, using American cement. A large hospital has been planned, to which the generous

support of all, including the Governor, has been given. This is to be all concrete. Large warehouses of steel and concrete are under way. A new hotel, of four stories, with full electric equipment, modern American plumbing, elevator, &c., is planned at a cost of \$100,000. A new theatre, costing about \$400,000 is now nearly completed, and scores of new dwellings are planned. All this springs from the foundation stone of better pavements, sidewalks and drainage. As the contracts for these improvements specify "that they shall be equal to the best work in New York, London, Berlin, Paris or Vienna," it is very evident that they will be a credit both to the city and the contractor. It is to be hoped that New Jersey's fine trap-rock may have a good share in this work.

BITUMINOUS MACADAM.

To make good pavements in these days requires the highest skill and ability of our best engineers and road-builders.

Through all modern street-pavement work lies the spirit of evolution. First came the dirt street, rounded up in the center to shed the rain, followed later by gravel. Then macadam and telford, twelve to sixteen feet wide in the country and full width in the city, with curbs in place. As wear and tear increased, these were gradually replaced by various kinds of pavement; the cedar block in the West, the creosoted block in the Western and Middle States and various other kinds of wooden pavements. The asphalt block came next, and then vitrified brick by many makers of all colors, sizes, mixtures and kinds; then syenite, granite and trap-rock blocks of various sizes and from many different localities, sandstone blocks from New York State and Eastern States, asphalt rock and bituminous, both land and lake, from all parts of the world. From all of these we find the permanent pavements of to-day are brick, asphalt and granite.

Now a new pavement appears on the scene and demands recognition as to quality, standing distinctly on its merits.

On investigation we find that this pavement is being laid in many cities at the present time with great satisfaction, and we are led to inquire closely into its character. As its name implies, it is a mixture of a carefully-prepared bituminous and cement-

no idleness or waste in the construction of the line. Prompted by a new spirit of enterprise, the Chinese are leading a life of industry and are endeavoring to overcome all chances as well as difficulties in the progress of their railroads and industries.

Twenty-five miles north of Tientsin, near the capital of Peking, stands a little town of about 10,000 people, and some of the Chinese are beginning to move into Peking, where they are doing some strange things and some worse things. The Chinese people, with a heavy climate, and a heavy load of things from the mountains, are beginning to move into the weather beaten—old town. The Chinese are building sidewalks and a new road, and are beginning to build modern habitation. The Chinese are beginning to build for five months of the year. The Chinese are beginning to solve the problem. The Chinese are beginning to build from three to six feet deep. The Chinese are beginning to build out for general improvement. The Chinese are beginning to levy on each half of the town. The Chinese are beginning to payment. The Chinese are beginning to been let for rock and soil. The Chinese are beginning to curbs and sidewalks are built. The Chinese are beginning to work is to be followed by the Chinese. The Chinese are beginning to The iron castings for well. The Chinese are beginning to Newark.

In addition to the work of the Chinese in which it is proposed, the Chinese are beginning to realize there that the Chinese are beginning to the world, although this may lead to the Chinese. The Chinese are beginning to Condition. The Chinese are beginning to the work and the Chinese are beginning to amount will be the Chinese.



stone in varying sizes, from one and one-half inch to powder, so as to reduce the voids to the lowest possible minimum. This is in contrast to asphalt, which, as a rule, has seventy-five per cent. of sand in its mixture.

THE PRINCIPLES INVOLVED IN THIS PAVEMENT.

"The principle on which the bituminous macadam pavement-wearing surface is combined is the reverse of the principle on which the ordinary asphalt pavement is built. In the present asphalt or tar pavement, the bituminous cement is used to support fine mineral grains, such as sand, which in themselves have no firmness to sustain traffic, in such a way that the fine mineral grains will be held or supported by the bituminous cement so that the mortar or mastic will, at all atmospheric temperatures, sustain the weight of traffic and at the same time resist abrasion. The bituminous macadam is built on the principle that independent of the bituminous cement, relatively coarse and fine mineral grains should be combined in such a way as to have a firmness in themselves to sustain the weight of traffic. The bituminous cement is supported or held in place by the proper arrangement as to size of stone particles. The bituminous cement is used solely for the purpose of preventing attack on the stone from water and weather and to bind the particles together sufficiently to prevent abrasion from traffic at all atmospheric temperatures, and at the same time provide an elastic bituminous cement or cushion between the mineral particles, which will deaden the jar and prevent the wearing effect caused by friction from the movement of its integral parts."

THE THEORIES OF CONSTRUCTION.

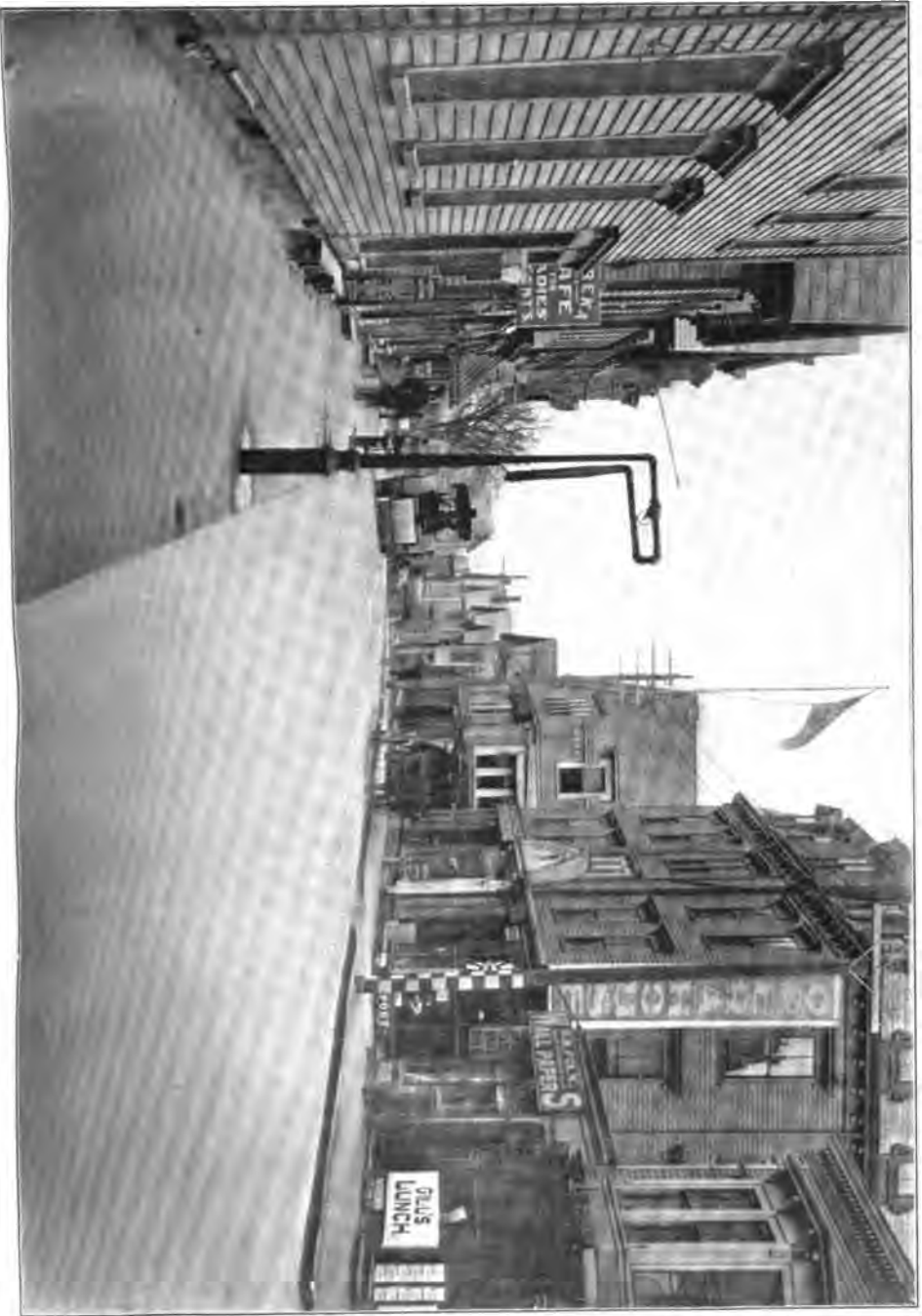
"The theories upon which the construction is based are—*first*, that with a solid, well-rolled sub-foundation and thoroughly rolled base of crushed stone, such as is used on the most improved macadam pavement and paved with bituminous cement, is practically as good as any foundation; *second*, that with a rough-

crushed stone base, coated with hot bituminous cement, and a scientifically-prepared wearing surface of bituminous concrete, made of crushed stone and bituminous cement, the shifting or rolling of the ordinary asphalt pavement can be overcome; *third*, that by using for the mineral aggregate of the wearing surface, angular particles of the hardest available crushed stone, varying in size from about three inches to an impalpable powder, in such proportion that the succeeding sizes will fill the coarser voids in the larger sizes, a far greater density could be secured than had previously been attained in either macadam or asphalt pavement construction. To secure the best results it is essential that the crushed stone, after heating, be separated into several sizes and then mixed by machinery in definite proportion by weight; *fourth*, that by increasing the density and thus decreasing the voids, and by having the bulk of the mineral aggregate composed of coarse, angular particles of stone, the voids can be thoroughly filled with bituminous cement, and by using a bituminous cement, which is unaffected by water, a thoroughly water-proof wearing surface of bituminous concrete can be produced; *fifth*, that particles of carefully-selected, crushed, hard stone, held firmly in place by an elastic bituminous water-proof cement, would provide for the wearing surface of a pavement one of the most durable substances known, and a sufficiently rough surface to give an ideal foothold for horses."

The use of graded stones reduces the voids in the mineral mixture and the rigidity of the stone permits of the use of a softer and therefore more durable bituminous cement than can be used with sand. The bituminous macadam surface is so dense and the particles of stone so firmly held in place by the bituminous cement that even when made of the hardest trap-rock, a section of the pavement, when chilled and broken, will fracture through the stone. In other words, the stone will break before it will cleave from the cement.

Carrying out this detail in actual construction work, claims are made for this pavement of availability and simplicity of construction, ease of repair, durability, no mud or dirt, no slippery surface, resiliency, sanitary advantages and others.

The bituminous macadam of to-day is the result of years of study of those engaged in the asphalt business for a generation. As



Bituminous Masticum Pavement.

a result of this study we find that it is being laid in the following cities in the United States:

In Massachusetts—Brookline, Holyoke, Lynn, Boston, Cambridge, Everett, Nantucket, Brockton, Lowell, Taunton, Worcester and Waltham. . At Allentown, Pa.; Cleveland, Ohio; Duluth, Minn.; Manistee, Mich.; Mt. Clemens, Mich.; Nashville, Tenn.; Portland, Me.; Rome, N. Y.; Bay City, Mich.; Harrisburg, Pa.; London, Ont.; Mauch Chunk and Norristown, Pa.; Newport, Ky.; Pawtucket, R. I.; Brooklyn, Ohio; Conshohocken, Pa.; Huntington, Ind.; Ironton, Ohio; Montpelier, Ind.; Newport News, Va.; Norwich, N. Y.; Port Huron, Mich.; Tacoma, Wash.; Watertown, N. Y.; Saginaw, Mich., and Yonkers, N. Y., aggregating some 700,000 square yards, all under a guarantee of construction and maintenance.

HOW NEW JERSEY IS INTERESTED.

We of New Jersey pride ourselves in having the best material in the world for making roads, and this through the help of the State has given us one thousand miles of improved highways. I refer to our trap-rock, known and quoted all over this country. For the making of bituminous pavement in our State or nearby points, in the future the best material will be sought and used. This opens up another market for our stone. The bituminous macadam pavement has come to stay and take its place along side our high-grade pavements for lasting qualities and practical road-building, and engineering skill shown in those already constructed.

STATE ROAD IMPROVEMENT ACROSS THE MEADOWS BETWEEN NEWARK AND JERSEY CITY.

The following, an abstract from an article in "The Automobile and Motor Review" of December 13th, 1902, will be of interest to owners of automobiles and to property-holders in New Jersey:

The proposal to construct a first-class macadam road across the meadows from Jersey City to Newark, New Jersey, and the laying on the same of an experimental block of steel rail for all sorts of vehicular travel, is a matter of especial interest and great importance to the users of automobiles and thousands of other vehicles.

The importance of this road is great, in that it forms a connecting link between New York and the whole system of improved State highways of New Jersey, making pleasantly accessible between one thousand and two thousand miles of some of the finest touring country in the United States.

TERRITORY MADE ACCESSIBLE.

New Jersey leads the country in the matter of road improvement, having constructed under State aid over seven hundred miles of hard roads since 1895, and by counties and other municipalities as many more. A large portion of this work has been done in the northern part of the State. A number of cross State roads have also been improved as well as several near and parallel to the coast. From Newark the best of roads lead directly to such important cities as Paterson, Rutherford, Morristown, the Oranges, Elizabeth, New Brunswick, Perth Amboy, South Amboy, Plainfield, Trenton, Freehold, Philadelphia, and to such well-known and popular winter and summer resorts as Lakewood, Cedarhurst, Asbury Park, Long Branch, Cape May and Atlantic City.

WILL OPEN FINE TOURING SECTION.

Some of the finest scenery in the country is in New Jersey, and except for the inconvenience and unpleasantness of making the run through Jersey City and along a rough and often very muddy road across the Hackensack meadows, New York motorists would do much more riding and touring there. New Jersey is fully awake to the value of good roads as an inducement to wealthy New York business men to build not only summer homes west of the Hudson river, but to take up their permanent residences there, and, as many persons of this class have recently become owners of automobiles, the Road Commissioner and the freeholders will be fully in sympathy with the movement to provide a good connecting link from this territory to New York City.

AFFECTS NEW YORK AND NEW ENGLAND.

On the other side, New York State, Connecticut and Massachusetts have all been very active during recent years in the building of improved roads under State Aid laws. New York State has constructed more than one hundred and fifty miles of macadam roads since the passage of the Higbie-Armstrong act of 1898, and last winter the Legislature appropriated \$795,000 for the State's share toward road improvement, which, together with the share appropriated by the counties, made a total of \$1,590,000 to be expended during 1902 for State highways. About two hundred miles were in process of construction by the middle of November, and plans had been approved for three hundred and ten miles more to be improved. At the last session of the Legislature a bill was introduced providing for the issuance of State bonds for the purpose of raising \$20,000,000 with which to push the work ahead much more rapidly, and, although this was not passed, the Good Roads Committee of the Automobile Club of America is very much interested in it, and undoubtedly the support of the organization will be given to the bill when it comes before the Legislature again this winter.

The Catskills district and all of the Hudson river valley in New York are popular touring sections, while the Berkshire hills in Western Massachusetts, and the Connecticut and Hoosac

river valleys, in Connecticut, are also noted for their scenic beauties and good roads. Most of the automobile touring so far done in the United States has been over the State roads of Massachusetts, Connecticut and New York. With the improvement of the road across the Hackensack meadows, all of this territory will be directly connected with the touring section of New Jersey, thereby consolidating the best automobile touring States in the country into one great system. In the words of Mr. Stewart, almost two thousand miles of good roads will be made accessible to New York City upon the completion of such a road, as it will open the way to good highways that extend up into Southern New York State, as well as across the length and breadth of New Jersey to Camden, Delaware Water Gap and Dingman's Ferry. Moreover, by way of the Brooklyn bridge, such a road will form a connecting link from the Jersey roads to the excellent road system of Long Island, where motoring has long been most popular.

LOCATION OF PROPOSED ROAD.

There are now two wagon-roads across the meadows from Jersey City to Newark, one the Old Plank road and the other the Turnpike. The former is in a disreputable state, the planks having worn out, leaving chuck-holes that make riding unpleasant in dry weather and most disagreeable in wet weather. The improvement and maintenance of this road has been neglected, because, by its location, almost its full length, including the bridge over the Hackensack river and half of the bridge over the Passaic river, is in Hudson county, upon which thus falls by far the greater burden of the expense. So acute became the feeling between the two counties over the matter of paying for the maintenance of the bridges that for five months last year the road was closed, as there was no appropriation to pay for bridge tenders to swing the bridges for passing boats.

PRESENT CONDITION OF TURNPIKE.

The turnpike is in better condition, much broken stone having been laid upon it even during the past summer. It is raised four or five feet above the level of the swamp and does

not overflow, but the broken stone was never properly compacted by rolling, and the road is not sufficiently crowned in places, so that the riding is rough in dry weather and muddy after rain. Efforts to secure the construction of a good macadam road have heretofore been frustrated because, it is understood, the street railroad company which operates a line of electric cars on the turnpike declined to bear any of the burden of improvement or of construction of new bridges, claiming to have a private right of way. It has recently changed its attitude, however, and is now understood to be willing to contribute its share toward improvement. Its rails are laid on either side of the roadway about a rod apart. To make a first-class highway of this road it should be raised several feet more, broadened and well surfaced with broken stone, rolled hard. It is thought that the Newark factories will gladly contribute cinders for filling. The bridges should also be widened, as traffic becomes much congested on them. The length of the road that needs improvement most imperatively is about three and a quarter miles, the streets in Marion, at the east end, and in Harrison, at the west end, being paved with granite blocks, in fair condition.

AUTOMOBILE CLUB COMMITTEE MEETS.

At the meeting of the Automobile Club of America, it was proposed that the A. C. A. and the Automobile Club of New Jersey should co-operate to secure the construction of a good road across the meadows, and, if necessary, to raise subscriptions to further the work. A committee has since been appointed, consisting of Jefferson Seligman, of the Good Roads Committee of the A. C. A.; W. T. Stewart, Secretary of the Automobile Club of New Jersey, and General Roy Stone, to take up the matter with the proper authorities in New Jersey. On November 14th General Stone addressed a letter on the subject to Henry I. Budd, State Commissioner of Highways of New Jersey, as follows:

Hon. Henry I. Budd, State Commissioner of Highways, Trenton, New Jersey:

DEAR MR. BUDD—We are beginning to lay a specimen of steel road in New York City. The Automobile Club of America and the Automobile Club of New Jersey are considering the question of connecting the streets of Jersey City to those of Newark, either by a new road across the Hackensack meadows or the

improvement of the old turnpike. If the steel roads are satisfactory here, they would desire to have a double steel track laid across the meadows, the object being to reach the good roads of New Jersey.

I am not able to say whether the laws of New Jersey would permit the laying of the steel rails under State aid or whether some legislation would be necessary for that purpose? I think the clubs would make a substantial contribution if this work could be undertaken promptly, and I write to ask further necessary information in order that I may follow it up without delay.

Please let me hear from you at as early a date as possible.

Please give me the mileage of improved roads in New Jersey as nearly as practicable, also some estimate of the mileage on the Pennsylvania side, which would all be made accessible to motor travel from this city by a reconstructed link across the meadows.

Faithfully yours,

ROY STONE.

HOW EXPENSES WOULD BE DISTRIBUTED.

Commissioner Budd replied to this communication as follows:

TRENTON, N. J.

Gen. Roy Stone:

DEAR SIR—I think that the laying of steel rails would be permitted by the State Aid law of New Jersey, provided it took the usual course, that is, that the property holders along the line of the road should make application for its improvement by means of stone and steel rails, or that the freeholders should declare it a county road and order its improvement. In either case, if it received the approval of the State Road Commissioner, it would carry State aid. Of course the cost might have something to do with deterring action in the matter, but if the clubs would be willing to make substantial contribution, this would place it on the level of cost with the gravel, stone or shell roads.

In reply to your second question would say the mileage of improved roads in New Jersey ranges from twelve to fifteen hundred. There are very few improved roads on the other side of the Delaware—none that would reach from Philadelphia to Trenton.

H. I. BUDD,

State Commissioner of Public Roads.

The present State Aid Law of New Jersey provides that when the Board of Freeholders of any county decides to improve a certain road and the application and specification submitted by them to the State Commissioner of Highways have been approved, the State shall bear one-third of the cost of the work, the abutting property-owners one-tenth and the county the remainder. There is only one property-holder along the line of the road, namely, the Hackensack Meadows Improvement Company, and, while its ten per cent. of the cost would amount to a considerable sum, the company is said to be in favor of the improvement, as it will enhance the value of its property.

STEEL RAILS ACROSS THE MEADOWS?

There is no unanimity as yet, among those directly interested in securing a good road across the meadows, regarding the suggestion that steel rails be laid there for wagons and automobiles. General Stone, who for years has advocated the use of flat steel rails for the purpose of lightening traction on highways, hopes that the automobile clubs will be sufficiently interested in the matter to provide for the additional expense by direct contributions and subscriptions. No other expense in connection with the improvement of the meadows road would have to be borne by the clubs.

APPROPRIATION BY THE NATIONAL GOVERNMENT
FOR THE IMPROVEMENT OF THE
PUBLIC ROADS.

BY WM. P. BROWNLOW, M. C.

(In January *Cosmopolitan*.)

The plan proposed in House Bill No. 15,369, introduced by the writer on the first day of the present session of Congress, seeks to establish a policy to be pursued by the United States Government in reference to the permanent improvement of the public highways of the country. Some will say that such improvement is outside the jurisdiction of the general Government, but the Constitution was ordained and established (among other things) to "promote the general welfare," and Congress is especially authorized to "establish post-offices and post roads." Few things will contribute more in a time of peace and industrial prosperity to the general welfare than the permanent improvement of the public roads; and there never was a time when Congress could so appropriately exercise its power to establish post roads as at present, when, to use the language of the President's message—"Rural free delivery service is no longer in the experimental stage; it has become a fixed policy. The results following its introduction have fully justified the Congress in the

large appropriations made for its establishment and extension." Every such rural free delivery route is a post road.

It is well known that the Congress of the United States, during the early history of the Republic, appropriated large sums of money to build and maintain a system of National roads, the most famous one of which is known as the "old Cumberland road," and by reason of its pre-eminence, the "old National road." This road was started in the year 1811, at Cumberland, Maryland, and continued almost due west in practically a straight line through Maryland, Pennsylvania, Ohio, Indiana and Illinois to St. Louis, and is said to be the longest straight road ever built by any government in the world. Though never fully completed on the western extremity, it was substantially 700 miles long and cost about \$7,000,000, or practically \$10,000 a mile.

The subsequent abandonment of the policy of the United States Government, as expressed and carried out in this great road, has led many persons to suppose that the entire question of road-building, or substantial aid thereto, so far as the United States Government is concerned, had been settled and disposed of for all time; but a careful examination of the controversy, which ended in the abandonment of the former policy of the United States, will show that it turned more upon the question of jurisdiction pertaining to the control of the road by the United States Government, or by the various State governments, through whose territory the road passed, than upon the right of Congress to make appropriations to build such roads. Most of the trouble resulted from the attempt to collect toll for the use of the road, and not on account of appropriations of money from the United States Government to build it. The objection was not made to a free road, but to a toll road. The infringement of the rules for collecting toll subjected the citizens of the various States to the pains and penalties of violating a United States law and of being arrested by the United States officials.

The original policy of the United States Government, by which it appropriated all the money required to build a great road, was followed by the other extreme of appropriating nothing either to build or to maintain or to contribute in any way to the betterment of the common highways of the country. This latter policy has continued for practically two generations, and the result is that there has been very little improvement in our public roads. While

the Nation has made more progress than any other nation in the world during that time, it is a remarkable fact that it is behind all other civilized nations in reference to the improvement of its highways. It seems that by the former policy the Government did too much, and by the later policy it does too little. There should be a middle ground between these two extremes, which would conform to the composite nature of our Government, and have a tendency to distribute more equitably its burdens and benefits.

A reference to the present bill will show that it does not seek to re-establish the original policy requiring the United States Government to appropriate the total amount of money necessary to improve any given highway, but that it only provides that the Government shall contribute one-half of its cost, when the road is built, in co-operation with "any State or political subdivision thereof." The following sections are quoted from the bill:

Sec. 5. That any State or political subdivision thereof, through its proper officers having jurisdiction of the public roads, may apply to the Director of the Bureau of Public Roads for co-operation in the actual construction of a permanent improvement of any public highway within the said State in the following manner: Every application for the co-operation herein provided for shall be accompanied by a properly certified resolution stating that the public interest demands the improvement of the highway described therein, but such description shall not include any portion of a highway within the boundaries of any city or incorporated village.

Sec. 6. That the Director of said Bureau, upon receipt of any such application, shall investigate and determine whether the highway or section thereof sought to be improved is of sufficient public importance to come within the purposes of this act, taking into account the use, location and value of such highway or section thereof for the purposes of common traffic and travel, and for the rural free delivery of mail by the United States government, and after such investigation shall certify his approval or disapproval of such application. If he shall disapprove such application, he shall certify his reasons therefor to the public officer or officers making the application.

Sec. 7. That if the Director of said Bureau shall approve such application, he shall cause the highway or section thereof therein described to be mapped, both in outline and profile. He shall indicate how much of such highway or section thereof may be improved by deviation from the existing lines whenever it shall be deemed of advantage to obtain a shorter or more direct road without lessening its usefulness, or wherever such deviation is of advantage by reason of lessened gradients. He shall also cause plans and specifications of such highway or section thereof to be made for telford, macadam or gravel roadway, or other suitable construction, taking into consideration climate, soil and material to be had in the vicinity thereof, and the extent and nature of the traffic likely to be upon the highway, specifying, in his judgment, the kind of road a wise economy demands.

It is important to notice that in case any State should fail to avail itself of the privileges granted in this bill, any political subdivision of the State could take advantage of it. Some of the States have provided political machinery whereby they can take charge of and direct the work of road-making; others have not, but there is no State that has not some political subdivisions in it that are provided with the proper political machinery for putting this work into operation, and they may thereby avail themselves of all the benefits provided for in the bill. In order that no State may receive an undue advantage in the distribution of this fund by reason of priority of application or greater ability to furnish its portion of the cost, it is provided in Section 13 "that no State shall receive in aid of road construction out of any money appropriated for that purpose according to the provisions of this act a greater proportion of the total amount appropriated than its population bears to the total population of the United States."

The change in the policy of the United States Government, as indicated above, has been adopted by all of the States in the Union that originally built State roads or gave substantial aid in maintaining them. Many of the older States followed concurrently the original policy of the United States in building and maintaining State roads within their limits as the United States Government built and maintained the National road system connecting State with State. But all these various States abandoned that policy and followed the example set by the general Government of withdrawing their support from the movement, and the result has been that the entire cost of building good roads in the United States during the last two generations has fallen upon the counties or the townships or the districts in the immediate locality of the road improved. The entire burden of road construction has therefore been thrown upon the people and property of the rural districts, which has proven to be too heavy a burden for most of them to bear. The consequence is that the burden has been dropped to a great extent and the roads remain unimproved. It was perhaps not unnatural when the great mass of all the people in the United States lived in the rural districts, to require each community to make such improvements as it chose of its own public roads; but at the present time a very large proportion of the population and a much larger proportion of the wealth is concentrated in large cities, and according to the generally pre-

vailing method they do not contribute anything to the improvement of the highways. It is therefore desirable that some new method should be introduced whereby all the people shall contribute to the improvement of all the roads. This is not only desirable, but it is just and equitable, because the public highways belong to all the people, and their improvement is beneficial to those living in the great cities as well as those living in the rural districts. This is especially true when we consider the newly-invented vehicles that are now in common use upon the highways, that is to say, the bicycle, the automobile and the suburban street car.

Within the last few years several progressive States have inaugurated a new method of co-operation different from that prevailing at any time before in this country, either according to the policy of the general Government or the government of any of the States. The beneficial results that spring from such a co-operative method of building permanent highways have been well illustrated by the States of New Jersey, Massachusetts and New York. In each of these States a general road fund is provided by taxing all the property in the entire State, both city and country. The fund so raised is contributed to very largely by those who, under the heretofore prevailing plan, would not pay anything for such purposes. In the State of New York, nearly ninety per cent. of the State tax, and consequently of the road fund, is paid by people living in great cities and by the corporations of the State, so that only about ten per cent. of the State road fund is paid by the owners of property in the rural districts, although by a provision of the law one-half of the cost of each and every improved highway is paid for out of this general fund, the remaining half being paid by the county, fifteen per cent. of which may be taxed against the property abutting upon the improved road. In the twelfth section of the bill is a proviso that nothing herein shall be construed to prevent any State or political subdivision thereof from distributing the said one-half, so that the State may bear a portion, the county a portion, and the owners abutting on the said road another portion.

The bill under consideration seeks to extend the principles of co-operation to a still greater extent, and to bring in the United States Government as a co-operating factor to contribute its quota out of a fund that is still more general than any State fund could be,

and to which all the people contribute more or less. If it is wise and equitable and beneficial for the State of New York to raise a general fund, out of which a portion of the cost of constructing the highways is to be paid, it would seem to be just as equitable and beneficial for the United States Government, having already raised the general fund, to contribute a portion towards the cost of constructing permanent highways in each and every State. Appropriations made by Congress for the River and Harbor bill aggregate in the whole something over \$440,000,000, and the last annual River and Harbor bill appropriated an amount nearly equal to \$1 *per capita* for all the people of the United States. for the single purpose of cheapening transportation over water, by deepening the water in the rivers and harbors, whereas the entire appropriation annually by any State for all State purposes seldom exceed \$1 *per capita*, and is generally less. If it is a good policy to appropriate so liberally in the River and Harbor bill, which no one seems to doubt, it may be just as good policy to contribute with equal liberality to cheapening transportation over land, and especially when it is considered that for every dollar contributed by the United States, at least an equal amount must be contributed by the various States and subdivisions to supplement that fund, which is not the case in the River and Harbor bill.

Another reason for this course will be found in the fact that nearly all the great appropriations made by the United States Government are expended in or near great cities, while but little, and generally nothing, is expended in the rural districts to benefit the inhabitants thereof. The great river and harbor improvements, and the great public buildings are found mostly in the great cities and illustrate the general rule.

A MACHINE FOR ROAD REPAIR.

BY ROB'T A. MEEKER.

As the number of miles of improved roads increases the problem of repair and maintenance demands more attention. In fact, this question is forcing itself into every debate on good roads. It must be met and answered clearly.



Porcupine.



Porcupine in use.

Macadam needs regular attention and prompt repair; the proverbial stitch in time applies to stone roads as aptly as to any other work of every-day life. Notwithstanding the best of care, a macadamized road will rut, and with the half care that many of them have received, these ruts and holes have become very numerous. The problem that now requires an answer, is how can we remove these ruts and holes and restore the surface of our roads most easily, quickly and cheaply.

Hand-picking of macadam is slow and expensive. Except during very wet weather repairs without picking are seldom satisfactory.

A new implement has lately been invented that seems to solve the problem. It is called the "Porcupine." This machine breaks up the surface of the hardest macadam in a uniform manner to a depth that removes ruts, and permits of reforming the road. The further simple process of rolling the surface with the addition of new crushed stone is then sufficient to make the road as good as new.

The "Porcupine" loosens and separates the particles of the road surface without breaking the pieces of crushed stone composing it. The accompanying view illustrates the whole operation. No belt power or mechanism is required to operate the scarifier. It is simply pulled by a steam roller or similar machine. A seven to ten ton steam roller is powerful enough to do the work. Attachment to the roller is made by a chain, and the machine can be attached or detached in a moment.

The roller draws the Porcupine to the end of the length of street being repaired, then laps over and draws it back again. At every pass the road is thoroughly loosened to the width of the Porcupine. If desired, the street can then be harrowed or raked in order to form up the crown, and afterwards rolled down, the addition of fine stone and dust as a top dressing and the use of a sprinkler in the usual manner, giving a new street, perfect in every way. The expense is so low that it pays far better to do this than to attempt repairs in any other way.

The machine can be regulated by one man. It follows straight and true. There is no jumping about or switching from side to side. The depth of scarifying can be regulated while the machine is in operation. It will perform its work moving in either direction.

As a reasonable example of what can be done with this machine in connection with a steam roller, one Porcupine has in one day scarified one block of the hardest city street that could be found; the surface was then shaped up and rolled down again, the whole being completed between the hours of 10 A. M. and 6 P. M. with the labor of four men. The above represents an average day's work of an outfit of scarifier in connection with steam roller. If we speak of the amount of surface that might be scarified in one day, the machine will thoroughly loosen in ten hours 4,000 square yards.

In the hardest macadam it is steady as an ordinary plow in soft ground. Not only can the depth of the spikes be regulated for scarifying purposes, but they can be easily raised to go over crossings, &c.

When it becomes necessary to either raise or lower a roadway, the scarifier is very useful.

It is especially advantageous where a road requires reshaping and only a small addition of new crushed stone.

The wear and tear of the spikes is not great, and when necessary they can be readily sharpened. A new set can be put in cheaply, at a moment's notice, while the others are being sharpened.

Counties adopting this device will find the cost of their road repairs lessened, and, in addition, the repairs will be of a permanent nature. The streets that have been remade with the Porcupine are equal in every instance to new, so that it can be readily figured that a Porcupine will pay for itself in a very short time.

The old method of dumping new crushed stone in depressions of the road is expensive and unsatisfactory. It has been found that time and traffic could not be trusted to consolidate such pieces of road. In order to make new metal bind with old surfaces, the latter must be loosened and separated in order that the new material may bind with the old.

Counties and townships will find that the Porcupine will aid greatly towards reducing the expense of their road maintenance, giving, at the same time, for the money spent, far better results.

MARCELLUS SHALE.

BY ROBT A. MEEKER.

The question of a thoroughly satisfactory binder is one that is constantly presenting itself to all road makers. Many substances have been recommended and used, with varying degrees of success, but raveling of the surface has continued. In 1899, marcellus shale was put upon the market and placed upon Riverside drive and many of the drives in Central Park, in the city of New York. This rock first attracted my attention in 1875, when driving over the Milford road, from Port Jervis, N. Y., to Milford, Pa., along the western bank of the Delaware river. This road was one of the best natural roads that it had ever been my pleasure to drive over, and I had often thought that it would make a splendid binder for our macadam roads, but feared that it would not stand the heavy travel of urban and suburban districts. For this reason I hesitated to recommend the use of the shale until I had thoroughly satisfied myself upon that point. The shale was spread upon the drives, as before stated. Since that time I have watched the wear and general condition of the surface and have been agreeably surprised at the good qualities of the marcellus shale as shown under very trying conditions, on Riverside drive, because of its exposed location. The winds sweep over it and the water from the higher ground rushes upon it. Notwithstanding the disintegrating effects of both wind and water, the surface is in better condition than that of many trap-rock covered streets and roads near it. In addition to its cementing properties, it also forms a springy surface for the horses and wagons to travel over, thus making not only a durable, but also much more pleasant surface than trap-rock.

In order that others interested in road building may see and judge for themselves the good qualities of this shale as a surfacing for macadam roads, I subjoin a list of the other places in which it is in use:

Brooklyn, N. Y.—Sackett Boulevard, Prospect Park to Washington street; Ocean Parkway, Brooklyn to Parkville.

In New Jersey—Rutherford, Hillsdale, South Paterson, Lakeview, Clifton, Franklin and Bayonne.

NUMBER OF MILES OF PAVEMENT IN THE
UNITED STATES.

BY MR. CRANDALL.

There is said to be a total of about one thousand miles of cobblestone pavement, three thousand five hundred of granite and Belgian block, two thousand of brick, one thousand five hundred of wooden blocks and three thousand five hundred of sheet and block asphalt, making a total of eleven thousand five hundred miles of improved streets to be found in American cities. In addition to this there are about four thousand five hundred miles of gravel streets, and four thousand miles of macadam streets. A conservative estimate would place the total mileage of streets improved and unimproved at forty thousand, fully one-half of which have been improved.

The total cost of pavement laid in American cities, exclusive of macadam and gravel, is about \$506,000,000.

QUARRIES IN NEW JERSEY PRODUCING ROAD METAL.

BERGEN COUNTY.

<i>Location of Quarry.</i>	<i>Owners.</i>	<i>P. O. Address.</i>
Edgewater.....	Cody Bros.	Edgewater, N. J.
Linwood.....	Carpenter Bros.	Linwood, N. J.
Shady Side.....	Brown & Fleming.....	Englewood, N. J.
Fairview.....	Fairview Stone Crushing Co.....	1996 Chambers St., N. Y.

ESSEX COUNTY.

Montclair.....	Osborne & Marcellis.....	Upper Montclair, N. J.
Montclair.....	F. J. Marley.....	Little Falls, N. J.
Orange.....	Geo. Spottswood & Co.....	Orange, N. J.
Millburn.....	G. A. Lighthipe & Son.....	Millburn, N. J.
Cedar Grove.....	F. J. Marley.....	Little Falls, N. J.
Montclair.....	Francisco Bros.	Orange, N. J.
Short Hills.....	Stewart Hartshorn	Orange, N. J.
Caldwell.....	P. A. Matthews.....	Caldwell, N. J.

HUDSON COUNTY.

Bergen Hill.....	B. M. & J. F. Shanley.....	Newark, N. J.
Palisades.....	Palisade Construction Co., No. 1 Montgomery St., Jersey City, N. J.	
Palisades.....	Hudson County Contracting Co., No. 367 Communipaw Ave., Jersey City, N. J.	
Guttenberg.....	Meeks	Guttenberg, N. J.
Granton.....	Wagner & Duff	Granton, N. J.
Granton.....	F. J. Marley.....	Little Falls, N. J.
Woodcliff.....	John S. Lane & Sons.....	Guttenberg, N. J.
Shady Side.....	Bull's Ferry Land Co.....	Guttenberg, N. J.

HUNTERDON COUNTY.

Byram Station.....	B. M. & J. F. Shanley.....	Newark, N. J.
Byram Station.....	Trenton Stone and Construction Co.....	Trenton, N. J.
Lambertville.....	W. N. Ireland, Agent.....	1241 Filbert St., Phila., Pa.
Middle Valley.....	Middle Valley Trap Rock Co.....	Middle Valley, N. J.

MERCER COUNTY.

Moores.....	Delaware River Quarry and Construction Co., Lambertville, N. J.	
Goat Hill.....	B. M. & J. F. Shanley.....	Jersey City, N. J.
Hopewell.....	Hopewell Quarry Co.....	Hopewell, N. J.
Titusville.....	Trenton Stone and Construction Co.....	Trenton, N. J.
Belmont.....	Mercer County Workhouse.....	Trenton, N. J.

MORRIS COUNTY.

Nearly all road-building material in this county is of native rock, gneiss, granite and shale. The traps are mostly imported from other counties.

<i>Location of Quarry.</i>	<i>Owners.</i>	<i>P. O. Address.</i>
Millington	Morris County Crushed Stone Co.....	Morristown, N. J.
Mountain View	Standard Paving Co.....	Mountain View, N. J.

PASSAIC COUNTY.

Garret Mountain	Francisco Bros.	Little Falls, N. J.
Paterson	F. J. Marley.....	Little Falls, N. J.
Paterson	Paterson Crushed Stone Co.....	Paterson, N. J.
Paterson	New Jersey Stone Co.....	Rutherford, N. J.
Paterson	McKiernan & Bergen	Paterson, N. J.
Notch Road	F. J. Marley.....	Little Falls, N. J.
Notch Road	Dowling Construction Co.	Paterson, N. J.
Haledon	R. M. Torbet.....	Haledon, N. J.
Hawthorne	Daniel & D. Stanley.....	Hawthorne, N. J.
Preakness	Colfax & Steele'	Pompton, N. J.
Great Notch.....	Wright & Lindsley.....	Orange, N. J.
Paterson	Preakness Stone Crushing Co.....	Paterson, N. J.

SOMERSET COUNTY.

Dunellen	Garrison & Gray	Dunellen, N. J.
North Plainfield.....	A. I. & N. B. Smalley	Plainfield, N. J.
Bernardsville	Somerset Stone Crushing Co.....	Bernardsville, N. J.
Mine Brook	James Freeman	Mine Brook, N. J.
Plainfield	J. Y. Wilson & Co.....	Plainfield, N. J.
Millington	Millington Stone Co.....	Millington, N. J.
Chimney Rock.....	Bound Brook Crushed Stone Co.....	Bound Brook, N. J.
Somerville	William Hardgrove.....	Somerville, N. J.
Rocky Hill	Rocky Hill Stone Storage Co.....	Rocky Hill, N. J.
Bernardsville	Frank S. Tainter	Morristown, N. J.
Far Hills	Grant Schley	Far Hills, N. J.
Bernardsville	Mine Brook Stone Co.....	Bernardsville, N. J.

SUSSEX COUNTY.

Newton	Newton State Quarry.....	Newton, N. J.
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UNION COUNTY.

Scotch Plains.....	Hetfield & Weldon.....	Scotch Plains, N. J.
Murray Hill.....	Commonwealth Company	Murray Hill, N. J.
Summit	A. A. Potter.....	Summit, N. J.
West Summit.....	Victor G. Smythe	West Summit, N. J.
Springfield	Stewart Hartshorn.....	Springfield, N. J.

GRAVEL PITS IN NEW JERSEY USED FOR ROAD BUILDING.

ATLANTIC COUNTY.

STON S. CH
OF
CIVIL ENGINEER

<i>Location of Pits.</i>	<i>Owners.</i>	<i>P. O. Address.</i>
May's Landing.....	Estate of Wm. Post	May's Landing, N. J.
May's Landing.....	D. E. Izard.....	May's Landing, N. J.
Estelville.....	A. E. Bourgeois	Estelville, N. J.
Tuckahoe	Henry D. and Wm. G. Moore, Haddonfield, and 931 Chestnut St., Phila., Pa.	
May's Landing.....	J. E. P. Abbott.....	May's Landing, N. J.
May's Landing.....	Samuel Champion	May's Landing, N. J.
Pleasantville.....	West Jersey and Seashore Railroad.....	Camden, N. J.
Pleasantville.....	P. & A. C. Railroad.....	Pleasantville, N. J.

BURLINGTON COUNTY.

Riverton	Lewis Connor	Riverton, N. J.
Westfield.....	Enoch Evans	Westfield, N. J.
Westfield.....	Estate of Wm. R. Lippincott.....	Westfield, N. J.
Palmyra	Isaac Evaul	Palmyra, N. J.
Palmyra	Wm. F. Morgan	Palmyra, N. J.
Burlington	Frank Warren	Burlington, N. J.
Burlington	James Mattson	Burlington, N. J.
Riverton	Franklin T. Hunter.....	Riverton, N. J.
Bridgeboro	Edwin M. Brock.....	Bridgeboro, N. J.
Moorestown	Michael Flynn	Moorestown, N. J.
Hartford.....	John Warrick	Hartford, N. J.
Rancocas.....	James W. Stokes	Rancocas, N. J.
Columbus	Thomas A. Bunting	Columbus, N. J.
Columbus	Thomas H. Rogers.....	Columbus, N. J.
Kinkora	C. G. Kinsley.....	Kinkora, N. J.
Columbus	Edward Wilson	Columbus, N. J.
Columbus	Charles Sharp.....	Columbus, N. J.
Florence	George Bowne.....	Florence, N. J.
Georgetown	John B. Hutchinson.....	Georgetown, N. J.
Jobstown.....	Charles Black	Jobstown, N. J.
Centerton	Allen Austin.....	Centerton, N. J.
Willingboro	Mrs. John Buzby	Willingboro, N. J.
Beverly	J. H. Comb.....	Beverly, N. J.
Burlington	Samuel Johnson	Burlington, N. J.
Beverly	William Baggs.....	Beverly, N. J.
Beverly	Joshua Fenimore.....	Beverly, N. J.
Moorestown	Samuel C. Decou.....	Moorestown, N. J.

CAPE MAY COUNTY.

Belle Plain.....	West Jersey and Seashore Railroad.....	Camden, N. J.
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CUMBERLAND COUNTY.

<i>Location of Pits.</i>	<i>Owners.</i>	<i>P. O. Address.</i>
Millville	John Golder.....	Millville, N. J.

MIDDLESEX COUNTY.

Old Bridge	I. Biddle Herbert.....	Old Bridge, N. J.
Helmetta	Geo. W. Helme.....	Helmetta, N. J.
Jamesburg	James Buckelew's Sons.....	Jamesburg, N. J.
Englishtown	Charles Hoffman.....	Englishtown, N. J.

MONMOUTH COUNTY.

Hopping	D. G. Campbell	Middletown, N. J.
Navesink	D. R. G. Andrews.....	Navesink, N. J.
Hopping	Peter L. Conover.....	Atlantic Highlands, N. J.
Leonardville.....	John T. Hopping.....	Leonardville, N. J.
Red Bank.....	Mrs. Henry Field	Red Bank, N. J.
Red Bank.....	James Hubbard.....	Red Bank, N. J.
Red Bank.....	John L. Applegate.....	Red Bank, N. J.
Chapel Hill.....	Geo. T. Hopping.....	Chapel Hill, N. J.
Middletown.....	J. D. Conover.....	Middletown, N. J.
Farmingdale.....	Manasquan Gravel Co.....	Asbury Park, N. J.
Allenwood.....	Manasquan Gravel Co.....	Asbury Park, N. J.
Shark River.....	Manasquan Gravel Co.....	Asbury Park, N. J.
Navesink.....	Webster Swan	Navesink, N. J.
Holmdel	William Crawford.....	Holmdel, N. J.
Keyport.....	Keyport Gravel Co.....	Keyport, N. J.
Red Bank.....	Red Bank Gravel Co.....	Red Bank, N. J.



The Old Mill Dam road, Tuckerton, Burlington Co. Average width, 22 feet.



The Tuckerton Boulevard, formerly Old Mill Dam road, Tuckerton, Burlington Co.,
now part of the Seashore line extending to Atlantic City. Width, 50 feet.

Statements by Engineers and Supervisors.

MAGNOLLA, N. J., October 27th, 1902.

Henry I. Budd, Esq., State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Pleasantville and May's Landing road, townships of Hamilton and Egg Harbor, county of Atlantic, State of New Jersey. Total length, 63,340.6 feet. Total length, 11.90 miles.

Width of gravel-bed, 14 feet.

Length of gravel-bed, 63,340.6 feet.

Depth of gravel-bed, 6 inches on edge, 8 inches in center.

Total cost of gravel purchased in the bank.....	\$547 37
Preparation of roadbed (cost).....	5,256 74
Compact gravel, 19,158.73 cubic yards, at 30 cents; total.....	5,747 62
Advertising	52 36
Earth excavation, 6,182 cubic yards, at 15 cents.....	927 30
Stripping, 12,275.27 cubic yards, at 15 cents.....	1,841 29
Overhauls, 4,618.13 cubic yards, at 18 cents.....	831 26
Overhauls, 819.67 cubic yards, at 36 cents.....	295 03
Overhauls, 686.78 cubic yards, at 54 cents.....	370 86
Open drain, 1,484 cubic yards, at 15 cents.....	222 60
Grubbing, 3.03 acres, at \$30.....	90 90
Supervisor's salary	825 00
Engineering expenses	510 25
Total	\$17,518 63

Maximum grade before..... 4.60 per cent.

Maximum grade now

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 8 inches, which must be and was ascertained by plugging not less than every 500 feet and measuring from the surface of the earth foundation to a line stretched across the opening.

Respectfully yours,

J. J. ALBERTSON,
County Engineer.
W. H. BURGESS,
Supervisor.

MAGNOLIA, N. J., October 30th, 1902.

Henry I. Budd, Esq., State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Hammononton and Pleasant Mills road, township of Mullica and town of Hammononton, county of Atlantic, State of New Jersey. Total length, 42,830 feet. Total length, 8.11 miles.

Width of gravel-bed, 14 feet.

Length of gravel-bed, 42,830 feet.

Depth of gravel-bed, 6 inches on sides, 8 inches in center.

Total cost of gravel purchased in the bank.....	\$1,137 54
Preparation of roadbed (cost).....	3,802 43
Compact gravel, 11,705.83 cubic yards, at 30 cents; total.....	3,511 75
Overhauls, 4,248 cubic yards, at 18 cents; total.....	764 64
Overhauls, 1,351.95 cubic yards, at 36 cents; total.....	486 70
Earth excavation, 903.46 cubic yards, at 15 cents.....	135 52
Stripping, 6,597.2 cubic yards, at 20 cents.....	1,319 44
Overhauls, 342.2 cubic yards, at 54 cents.....	184 78
Overhauls, 389 cubic yards, at 84 cents.....	326 76
Overhauls, 334 cubic yards, at \$1.02.....	340 68
Overhauls, 69 cubic yards, at \$1.20.....	82 80
Open drain, 3,480.3 cubic yards, at 15 cents.....	522 05
Advertising	50 03
Supervisor's salary, 154 days, at \$3.....	462 00
Engineering expenses	393 81

Total \$13,520 93

Maximum grade before.....	4.58 per cent.
Maximum grade now	2.00 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 8 inches, which must be and was ascertained by plugging not less than every 500 feet and measuring from the surface of the earth foundation to a line stretched across the opening.

Respectfully yours,

J. J. ALBERTSON,
County Engineer.
 GEORGE B. LUTTS,
Supervisor.

November 1st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Railroad and Summit avenues, township of Hillsdale, county of Bergen, State of New Jersey. Total length, 3,100 feet, or .59 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 3,100 feet.

Depth of stone-bed, 6 and 8 inches.

Number of tons of stone used in construction, 1,121.

Macadam, 4,285 square yards, at 41½ cents; total.....	\$1,778 27
Telford, 537 square yards, at 56 cents; total.....	300 72
Barth excavation, 1,486 cubic yards, at 22 cents; total.....	326 92
Supervisor's salary	28 00
Engineering expenses	138 00

Total \$2,571 91

Lump sum, contract price..... \$2,405 91

Maximum grade before..... 4 per cent.

Maximum grade after..... 3.1 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 8 inches.

Respectfully yours,

P. E. VAN BUSKIRK,
Engineer.

ABRAM C. HARING,
Supervisor.

November 1st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of West Hillsdale avenue, township of Hillsdale, county of Bergen, State of New Jersey. Total length, 2,257 feet, or .43 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 2,257 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, 815.

Macadam, 3,511 square yards, at 41½ cents; total.....	\$1,457 00
Barth excavation, 2,370 cubic yards, at 22 cents; total.....	521 40
Supervisor's salary	25 00
Engineering expenses	112 71

Total \$2,116 17

Maximum grade before..... 5.5 per cent.

Maximum grade after..... 2.9 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

P. E. VAN BUSKIRK,
Engineer.

ABRAM C. HARING,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Medford Red Lion road, townships of Medford and Southampton, county of Burlington, State of New Jersey. Total length, 23,722 feet, or 4.493 miles.

Width of stone-bed, 10 and 16 feet.

Length of stone-bed, 23,722 feet.

Depth of stone-bed, 6 inches.

Macadam, 29,041 square yards, at 67 cents; total.....	\$19,457 31
Drain 4,980 lineal feet, at 15 cents; total.....	747 00
Supervisor's salary	522 00
Engineering expenses	421 13
Total	\$21,147 44

Maximum grade before.....	4 per cent.
Maximum grade after.....	3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

JNO. W. HARRIS,

Engineer.

HENRY L. GARWOOD,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Mount Holly and Smithville road, townships of Northampton, Eastampton and Lumberton, county of Burlington, State of New Jersey. Total length, 16,949 feet, or 3.21 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, including extra, 17,148 feet.

Depth of stone-bed, 8 inches.

Macadam, 22,852 square yards.....	}	\$17,378 00
Earth excavation, 12,733 cubic yards, }		
Drain, 1,620 lineal feet, at 18 cents; total.....		\$291 60
Supervisor's salary		510 00
Engineering expenses		412 53
Total.....		\$18,582 13

Maximum grade before.....	6 per cent.
Maximum grade after.....	3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES LIPPENCOTT,

Engineer.

ALLEN F. POWELL,

Supervisor.

MAGNOLIA, N. J., October 30th, 1902.

Henry I. Budd, Esq., State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Clementon and Gibbsboro road, townships of Gloucester and Voorhees, county of Camden, State of New Jersey. Total length, 13,926 feet. Total length, 2.63 miles.

Width of gravel-bed, 14 feet.

Length of gravel-bed, 13,926 feet.

Depth of gravel-bed, 6 inches on edges, 8 inches in center.

Total cost of gravel purchased in the bank.....	\$282 00
Preparation of roadbed (cost).....	1,578 32
Compact gravel, 881.70 cubic yards, at 76 cents; total.....	670 09
Compact gravel, 1,362.92 cubic yards, at 94 cents; total.....	1,281 15
Compact gravel, 1,828.52 cubic yards, at \$1.12; total.....	2,047 94
Compact gravel, 139.04 cubic yards, at \$1.30; total.....	180 75
Earth excavation, 5,425.13 cubic yards, at 23 cents; total.....	1,247 78
Stripping, 1,632.25 cubic yards, at 25 cents; total.....	408 06
Tile drain, 2,432 lineal feet, at 10 cents; total.....	245 20
Supervisor's salary, 230 days, at \$3.....	690 00
Engineering expenses	258 97
Total	\$8,890 26

Maximum grade before	7.40 per cent.
Maximum grade now	4.20 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 8 inches, which must be and was ascertained by plugging not less than every 500 feet, and measuring from the surface of the earth foundation to a line stretched across the opening.

Respectfully yours,

J. J. ALBERTSON,

County Engineer,

WILLARD T. GIBBS,

Supervisor.

MAGNOLIA, N. J., October 27th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Stoy's Landing road, townships of Haddon and Delaware, county of Camden, State of New Jersey. Total length, completed, 4,000 feet, or .76 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 4,000 feet.
Depth of stone-bed, 8 inches.

Preparation of roadbed (cost).....	\$154 56
Macadam, 5,333 $\frac{1}{3}$ square yards, at 89 cents; total.....	4,746 67
Extra deep foundation, 666 $\frac{2}{3}$ square yards, at $22\frac{1}{4}$ cents; total..	148 32
Earth excavation, 1,400 cubic yards, at 25 cents; total.....	350 00
Tile drain, 650 lineal feet, at 15 cents; total.....	97 50
Supervisor's salary	228 00
Engineering expenses	169 38

Total \$5,894 43

Maximum grade before 6.20 per cent.
Maximum grade after 3.40 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

J. J. ALBERTSON,
County Engineer.
WILLIAM C. WOOD,
Supervisor.

MAGNOLIA, N. J., October 31st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Sandy Lane road, township of Centre, county of Camden, State of New Jersey. Total length, 11,624 feet, or 2.20 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 11,624 feet.
Depth of stone-bed, 10 inches.

Preparation of roadbed (cost).....	\$264 03
Macadam, 13,553 $\frac{2}{3}$ square yards, at \$1; total.....	13,553 67
Earth excavation, 1,570 cubic yards, at 28 cents; total.....	439 60
Supervisor's salary (estimated).....	312 00
Engineering expenses	497 08

Total \$17,066 38

Maximum grade before 10.60 per cent.
Maximum grade after 3.23 per cent.



River road, Camden Co., three-quarters of a mile from county line, before improvement.



River road, Camden Co., after improvement.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 10 inches.

Respectfully yours,

J. J. ALBERTSON,

County Engineer.

H. B. WOLOHAN,

Supervisor.

MAGNOLIA, N. J., October 27th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the River road, township of Pensauken, county of Camden, State of New Jersey. Total length, 16,996.7 feet, or 3.21 miles.

Width of stone-bed, 15 feet.

Length of stone-bed, 16,996.7 feet.

Depth of stone-bed, 10 inches.

Preparation of roadbed (cost).....	\$731 88
Macadam, 28,327.83 square yards, at 87½ cents; total.....	24,822 26
Sheating causeway	1,408 00
Railing causeways	419 31
Earth excavation, 26,100 cubic yards, at 18 cents; total.....	4,698 00
Drain, 1,579 lineal feet, at 10 cents; total.....	157 90
Supervisor's salary	930 00
Engineering expenses	988 80
Total	\$34,156 15

Maximum grade before 9.18 per cent.

Maximum grade after 4.81 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 10 inches.

Respectfully yours,

J. J. ALBERTSON,

County Engineer.

H. MORGAN HATCH,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the upper section of the Seashore road, county of Cape May, State of New Jersey.

Length of gravel-bed, 32,620 feet, or 6.178 miles.

Width of gravel-bed, 14 feet.

Depth of gravel-bed, 6 to 8 inches.

Preparation of roadbed, per contract.....	\$7,550 80
Preparation of roadbed, 1,425.8 feet in excess.....	380 01
Overhauls, 1,028.85 cubic yards, at 22 cents.....	226 34
18,224 1/11 cubic yards gravel, at 66 cents.....	12,041 10
Stripping gravel-bed.....	2 63
Carting.....	1 50
Engineering expenses.....	497 10
Supervisor's salary.....	342 00
Total.....	\$20,991 48

I hereby certify the above statement to be correct.

THOMAS R. WALES,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Asbury avenue, city of Ocean City, county of Cape May, State of New Jersey. Total length, 5,280 feet, or 1 mile.

Width of gravel-bed, 14 feet.
Length of gravel-bed, 5,280 feet.
Depth of gravel-bed, 6 and 8 inches.

Total cost of gravel purchased in the bank.....	\$1,471 06
Lump sum, contract price.....	1,000 73
Supervisor's salary, 102 days, at \$3.....	306 00
Engineering expenses.....	110 72
Total.....	\$3,548 51

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches, which must be and was ascertained by plugging not less than every 500 feet and measuring from the surface of the earth foundation to a line stretched across the road from the top of the grade stakes.

Respectfully yours,

RALPH L. GOFF,
Engineer.
ARTHUR BARROWS,
Supervisor.

NEWARK, N. J., November 8th. 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Ridge road, township of Verona, county of Essex, State of New Jersey. Total length, 10,776 feet, or 2.041 miles.

Width of stone-bed, 16 feet.
Length of stone-bed, 10,776 feet.
Depth of stone-bed, 8 inches.

Telford, 19,183 square yards, at 54 cents; total.....	\$10,358 82
Earth excavation, 11,662 cubic yards, at 30 cents; total.....	3,498 69
Total	\$13,857 42

Maximum grade before	9.59 per cent.
Maximum grade after	5.10 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,

Engineer.

CHARLES W. SMITH,

Supervisor.

NEWARK, N. J., November 8th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of West Passaic avenue, town of Bloomfield, county of Essex, State of New Jersey. Total length, 5,768 feet, or 1.092 miles.

Width of stone-bed, 16 feet.
Length of stone-bed, 5,768 feet.
Depth of stone-bed, 8 inches.

Telford, 10,267 square yards, at 55 cents; total.....	\$5,646 85
Earth excavation, 7,443 cubic yards, at 38 cents; total.....	2,828 34
Total	\$8,475 19

Maximum grade before.....	8.84 per cent.
Maximum grade after.....	6.75 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,

Engineer.

TUNIS GARRABRANT.

Supervisor.

NEWARK, N. J., November 8th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Sandford street, town of Irvington and borough of Vailsburg, county of Essex, State of New Jersey. Total length, 8,520 feet, or 1.612 miles.

Width of stone-bed, 16 feet.
 Length of stone-bed, 8,520 feet.
 Depth of stone-bed, 8 inches.

Telford, 15,177.3 square yards, at 60¾ cents; total.....	\$10,586 17
Earth excavation, 13,152 cubic yards, at 30 cents; total.....	3,945 60
Total	<u>\$14,531 77</u>

Maximum grade before.....	5.55 per cent.
Maximum grade after.....	3.50 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,
Engineer.
 IRA MEEKER,
Supervisor.

NEWARK, N. J., November 8th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the extension of Sanford street, town of Irvington, county of Essex, State of New Jersey. Total length, 3,122.2 feet, or .591 miles.

Width of stone-bed, 16 feet.
 Length of stone-bed, 3,122.2 feet.
 Depth of stone-bed, 8 inches.

Telford, 5,550.5 square yards, at 60¾ cents; total.....	\$3,871 47
Earth excavation, 5,475 cubic yards, at 30 cents; total.....	1,642 50
Total	<u>\$5,513 97</u>

Maximum grade before.....	7.81 per cent.
Maximum grade after.....	3.50 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,
Engineer.
 IRA MEEKER,
Supervisor.

NEWARK, N. J., November 8th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Mountain road, township of Verona, boroughs of Caldwell and North Caldwell, county of Essex, State of New Jersey. Total length, 17,901 feet, or 3.39 miles.

Width of stone-bed, 16 feet.
Length of stone-bed, 17,901 feet.
Depth of stone-bed, 8 inches.

Telford, 31,824 square yards, at 57 cents; total.....	\$18,139 68
Earth excavation, 33,373 cubic yards, at 35 cents; total.....	11,680 55
Cobblestone gutters, 2,311 1/9 square yards, at 72 cents; total.....	1,664 00
Total	\$31,484 23

Maximum grade before	16.97 per cent.
Maximum grade after	9.40 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JAMES OWEN,

Engineer.

FRED. E. PADDOCK,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find exact detailed statement of the cost of the Glassboro and Hardingville road, county of Gloucester and State of New Jersey. Total length of road, 26,955 feet, or 5.105 miles.

Width of gravel-bed, 2,669 lineal feet, 14 feet wide; 24,286 lineal feet, 24 feet wide.

Depth of gravel-bed, 8 inches in center and 6 inches at 7 feet each side of the center line and 1/2 inch at the sides.

CONSTRUCTION.

11,223 cubic yards excavation, at 20 cents.....	\$2,244 60
1-1/10 acres grubbing, at \$75.....	82 50
10,595 cubic yards compacted gravel, at 30 cents.....	3,178 50
1,503 cubic yards overhauls, at 14 cents.....	210 42
3,170 cubic yards overhauls, at 28 cents.....	887 60
2,445 cubic yards overhauls, at 42 cents.....	1,026 90
759 cubic yards overhauls, at 56 cents.....	425 04
4,380 cubic yards stripping, at 12 cents.....	525 60
	<hr/>
	\$8,581 16

MATERIAL.

Gravel	1,033 76
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MISCELLANEOUS.

Engineering expenses	\$289 80	
Supervisor's salary	516 00	
Committee expenses	40 00	
Advertising and printing.....	44 60	
		<hr/> \$90 40
Total	\$10,505 32	

Maximum grade before	3.2 per cent.
Maximum grade after	1.8 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of the finished pavement was 6 and 8 inches.

Respectfully yours,

WILLIAM C. CATTELL,
Engineer.
SAMUEL W. THOMAS,
Supervisor.

WOODBURY, N. J., June 19th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of German street, city of Woodbury, county of Gloucester, State of New Jersey. Total length, 559 feet.

Width of stone-bed, 16 feet.
Length of stone-bed, 559 feet.
Depth of stone-bed, 8 inches.

Preparation of roadbed (cost), included in excavations.....	
Macadam, 994 square yards, at 73 cents; total.....	\$725 62
Earth excavation, 175 cubic yards, at 25 cents; total.....	43 75
Drain, 735 lineal feet, at 10 cents; total.....	73 50
Supervisor's salary	54 00
Engineering expenses	31 86
	<hr/>
Total.....	\$928 73

Maximum grade before.....	3 per cent.
Maximum grade after.....	3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

WM. M. CARTER,
Engineer.
J. C. BATTEN,
Supervisor.

WOODBURY, N. J., July 17th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the completed portion of Delaware street, township of West Deptford, county of Gloucester, State of New Jersey. Total length, 8,820 feet, or 1.67 miles.

Width of stone-bed, 10 feet.

Length of stone-bed, completed portion, 6,800 feet.

Depth of stone-bed, 8 inches.

Preparation of roadbed (cost), included in excavations.....	
Macadam, 7,556 square yards, at 73 cents; total.....	\$5,515 88
Earth excavation, 2,453 cubic yards, at 25 cents; total.....	613 25
Shouldering, 129 cubic yards, at 25 cents; total.....	32 25
Drain, 2,608 lineal feet, at 10 cents; total.....	260 80
Supervisor's salary	174 00
Engineering expenses	128 44
Total	<hr/> \$6,724 62

Maximum grade before..... 5.4 per cent.

Maximum grade after..... 3.5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications and that the depth of finished pavement was 8 inches.

Respectfully yours,

WM. M. CARTER,

Engineer.

CHAS. N. BELL,

Supervisor.

October 29th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Trenton and Allentown Turnpike road, townships of Hamilton and Washington, county of Mercer, State of New Jersey. Total length, 19,286.6 feet, or 3.65 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 19,286.6 feet.

Depth of stone-bed, class B, or 6 inches.

Macadam, 30,712 square yards, at 65 cents; total.....	\$19,962 80
Earth excavation, 6,389 cubic yards, at 22.8 cents; total.....	1,456 69
Drain, 4,008 lineal feet, at 22 cents; total.....	881 76
Supervisor's salary	264 80
Engineering expenses	357 54
Total	<hr/> \$23,123 59

Maximum grade before..... 4.9 per cent.

Maximum grade after..... 2.6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was class B, or 6 inches.

Respectfully yours,

FRANK J. DPPELE,

Engineer.

H. M. ROGERS,

Supervisor.

October 24th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the construction of a portion of the Trenton and Allentown Turnpike road, township of Hamilton, county of Mercer, State of New Jersey. Total length, 13,300 feet, or 2.52 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 13,300 feet.

Depth of stone-bed, class B, or 6 inches.

Macadam, 21,480 square yards, at 46½ cents; total.....	\$9,988 20
Earth excavation, 6,951 cubic yards, at 34 cents; total.....	2,368 34
Supervisor's salary	301 00
Engineering expenses	308 79

Total	\$12,961 33
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Maximum grade before.....	3.1 per cent.
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Maximum grade after.....	2.1 per cent.
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We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was class B, or 6 inches.

Respectfully yours,

FRANK J. DPPELE,

Engineer.

HARRY M. ROGERS,

Supervisor.

November 7th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Edinburg, Dutch Neck and Princeton road, township of West Windsor, county of Mercer, State of New Jersey. Total length, with change, adding 502 feet, 34,791 feet, or 6.60 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, with change, 34,791 feet.

Depth of stone-bed, class B, or 6 inches.

Macadam, with change, 56,191 square yards, at 65 cents; total....	\$36,524 15
Earth excavation, 16,000 cubic yards, at 14 cents; total.....	2,258 50
Drain, 20,206 lineal feet, at 22 cents; total.....	4,445 32

Total \$43,227 97

Maximum grade before.....	7.4 per cent.
Maximum grade after.....	5.16 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was class B, or 6 inches.

Respectfully yours,

FRANK J. EPPLE,

Engineer.

E. H. HAWK,

Supervisor.

October 30th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Hamilton avenue and Dogtown road, township of Hamilton and city of Trenton, county of Mercer, State of New Jersey. Total length, 15,990.5 feet, or 3.03 miles.

Width of stone-bed, 12 feet and 14 feet, with 2,966 feet on Hamilton avenue; 10 feet wide on either side of car tracks; class B macadam.
Length of stone-bed, class B, 6,720 feet; class C, 9,270.5 feet.
Depth of stone-bed, class B, or 6 inches, and class C, or 8 inches.

Macadam—

Class B, 10,969 square yards, at 65 cents; total.....	\$7,129 85
Class C, 12,553 square yards, at 80 cents; total.....	10,042 40
1,977 square yards of extra class B macadam on Hamilton avenue, at 80 cents; total.....	1,581 60
4,907 square yards of class B macadam, at extra price of 15 cents above contract price, on Hamilton avenue, at 15 cents; total,	736 05
Earth excavation, 13,159 cubic yards, at 30 cents; total.....	3,947 70
Drain, 16,508 lineal feet, at 22 cents; total.....	3,631 76
Supervisor's salary	324 00
Engineering expenses	676 73

Total \$28,070 09

Maximum grade before.....	3.8 per cent.
Maximum grade after.....	1.5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was class B and class C macadam.

Respectfully yours,

FRANK J. EPPLE,

Engineer.

R. B. KONOVER,

Supervisor.

November 17th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the New Market road, township of Raritan, county of Middlesex, State of New Jersey. Total length, 10,560 feet, or 2 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 10,560 feet.
Depth of stone-bed, 8 inches.

Macadam, 14,080 square yards, at 55 31/40 cents; total.....	\$7.853 27
Earth excavation, 4,000 cubic yards, at 23 3/8 cents; total.....	945 36
Iron drain pipe, furnishing and placing.....	462 97
Engineering expenses	185 20
Supervisor	176 00
Total	\$9,622 80

Maximum grade before.....	5 1/2 per cent.
Maximum grade after.....	3 3/4 per cent.

We hereby certify the above statement to be correct and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,

Engineer.

GEO. E. CARMAN,

Supervisor.

November 18th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Hightstown and Manalapan road, township of Monroe, county of Middlesex, State of New Jersey. Total length, 13,358 feet, or 2.53 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 13,358 feet.
Depth of stone-bed, 8 inches.

Macadam, 17,846 square yards, at 96 cents; total.....	\$17,132 16
Macadam, wings	27 84
600 feet pipe and filling over same.....	150 00
Extra earth excavation, 4,250 cubic yards, at 20 cents; total.....	850 00
Carting and placing iron pipe.....	2 00
Drain, 6,498 lineal feet, at 15 cents; total.....	974 70
Supervisor's salary	327 00
Engineering expenses	414 24
Total	\$19,877 94

1 mile paid for in 1901.....	\$6,729 51
1.53 mile paid for in 1902.....	10,402 65

Maximum grade before.....	4 per cent.
Maximum grade after.....	2 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,
Engineer.
S. E. VAN DENBURGH,
Supervisor.

November 25th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the South River road, township of South River, county of Middlesex, State of New Jersey. Total length, 6,650 feet, or 1.26 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 6,650 feet.
Depth of stone-bed, 8 inches.

Macadam, 8,867 square yards, at 58 cents; total.....	\$4,834 90
Macadam, spurs and branches, 1,961.33 square yards, at 65 cents; total	1,274 86
Earth excavation, 500 cubic yards, at 28 cents; total.....	131 62
Drain, 150 lineal feet.....	
Supervisor's salary	177 00
Engineering expenses	131 65
Total	\$6,549 03

Maximum grade before.....	6 per cent.
Maximum grade after.....	4 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,
Engineer.
EDWARD WHITEHEAD,
Supervisor.

November 15th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the South Amboy and Keyport road, township of South Amboy, county of Middlesex, State of New Jersey. Total length, 11,880 feet, or 2.25 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 11,880 feet.
Depth of stone-bed, 8 inches.

Macadam, 15,840 square yards, at 55 28/100 cents; total.....	\$8,755 80
Extra macadam, 510 square yards, at 59 cents; total.....	300 90
Earth excavation, 2,000 cubic yards, at 23 42/100 cents; total....	468 44
Extra earth excavation, 1,000 cubic yards, at 25 cents; total.....	250 00
Iron drain pipe, furnishing and placing.....	144 41
Supervisor's salary	300 00
Engineering expenses	208 39
Total	\$10,427 94

Maximum grade before.....	6 per cent.
Maximum grade after.....	5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,
Engineer.
F. E. DE GRAW,
Supervisor.

November 17th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the South Plainfield road, township of Piscataway, county of Middlesex, State of New Jersey. Total length, 7,075 feet, or 1.34 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 7,075 feet.
Depth of stone-bed, 8 inches.

Macadam, 9,459 square yards, at 48 7/8 cents; total.....	\$4,621 91
Extra macadam, 5-inch, 263 square yards, at 27 1/2 cents; total....	72 33
Extra macadam, 8-inch, 335 square yards, at 55 cents; total.....	184 25
Earth excavation, 1,500 cubic yards, at 24 7/8 cents; total.....	373 13
Iron drain pipe, furnishing and placing.....	546 28
Engineering expenses	116 09
Total	\$5,913 88

Maximum grade before.....	3 1/2 per cent.
Maximum grade after.....	2 1/4 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

R. J. DOUGHERTY,
Engineer.
GEO. W. CORRIELL,
Supervisor.

November 22d, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Dayton-Jamesburg road, township of South Brunswick, county of Middlesex, State of New Jersey. Total length, 15,583 feet, or 2.95 miles.

Width of gravel-bed, 12 feet.

Length of gravel-bed, 15,583 feet.

Depth of gravel-bed, 10 and 6 inches.

Gravel, 4,618 cubic yards, at 50 cents; total.....	\$2,309 00
Barth excavation, 2,200 cubic yards, at 20 cents; total.....	440 00
Overhaul on gravel over ½ mile.....	964 75
Iron pipe culverts, 17 lengths of 12-foot pipe.....	120 00
Supervisor's salary	200 00
Engineering expenses	96 68
Total	\$4,130 43

Maximum grade before.....	3¼ per cent.
Maximum grade after.....	2¼ per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 10 and 6 inches.

Respectfully yours,

R. J. DOUGHERTY.

Engineer.

A. W. DEAN,

Supervisor.

November 22d, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Cranbury-Pleasant Hill road, township of Cranbury, county of Middlesex, State of New Jersey. Total length, 12,260 feet, or 2.32 miles.

Width of gravel-bed, 12 feet.

Length of gravel-bed, 12,260 feet.

Depth of gravel-bed, 6 and 10 inches.

Gravel—	
3,633 cubic yards, at 51 cents; total.....	\$1,852 83
1,000 cubic yards, at 19 cents; total.....	190 00
Barth excavation, 3,840 cubic yards, at 19 cents; total.....	729 60
Overhaul of gravel over ½ mile.....	790 95
Grading road 36 feet wide.....	700 00
Laying iron drain pipe.....	20 00
Supervisor's salary	200 00
Engineering expenses	200 00
Total	\$4,683 38

Maximum grade before..... 4 per cent.
Maximum grade after..... 3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 10 and 6 inches.

Respectfully yours,

R. J. DOUGHERTY,

Engineer.

PETER R. BERGEN,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Union Valley and Half Acre road, township of Monroe, county of Middlesex, State of New Jersey. Total length, 6,865 feet, or 1.30 miles.

Width of gravel-bed, 12 feet.

Length of gravel-bed, 6,865 feet.

Depth of gravel-bed, 6 and 10 inches.

Gravel, 2,034 cubic yards, at .4487 cents; total.....	\$912 70
Earth excavation, 600 cubic yards, at 19 cents; total.....	102 30
Extra earth excavation, 1,846 cubic yards, at 19 cents; total.....	350 74
Overhaul of gravel over $\frac{1}{2}$ mile.....	351 90
Placing drain pipe	40 00
Supervisor's salary	102 00
Engineering expenses	100 00
Total	<u>\$1,959 64</u>

Maximum grade before..... $5\frac{1}{2}$ per cent.
Maximum grade after..... $3\frac{1}{2}$ per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 and 10 inches.

Respectfully yours,

R. J. DOUGHERTY,

Engineer.

WM. B. DEY,

Supervisor.

KEYPORT, N. J., November 14th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Keyport and Keansburg road, township of Raritan, county of Monmouth, State of New Jersey. Total length, 10,175 feet, or 1.92 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 10,175 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 4,860.



Deep cut, Holmdel and Marlboro road, Monmouth Co., before improvement.



Holmdel and Marlboro road, Monmouth Co., after improvement.

Preparation of roadbed (cost).....	\$33 50
Macadam, 15,914.77 square yards, at 71 cents; total.....	11,299 48
Earth excavation, 4,700 cubic yards.....	
Drain, 8,365 lineal feet, at 12 cents; total.....	1,003 80
Supervisor's salary	198 00
Engineering expenses	370 10
Total	\$12,904 88

Maximum grade before	3.90 per cent.
Maximum grade after	2.50 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,
H. S. SPROUL,
Engineer.
JOHN CARR,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find a detailed statement of the cost of the Holmdel and Marlboro road, townships of Marlboro and Holmdel, county of Monmouth.

Length of stone-bed, 18,121 feet, or 3.43 miles.
Width of stone-bed, 14 feet.
Depth of stone-bed, 6 inches.

1901 CONTRACT.

18,121 lineal feet preparation of road-bed, at 4½ cents.....	\$838 37
2,612 feet 6-inch tile drain, at 9 cents.....	235 08
12,716 feet 4-inch tile drain, at 6 cents.....	762 96
31,010 cubic yards earth excavation, at 16½ cents.....	5,118 65
Widening roadbed	350 00
	<hr/>
	\$7,301 06

1902 CONTRACT.

2,000 cubic yards earth excavation, at 20 cents.....	\$400 00
28,188 square yards macadam pavement, at 69 cents.....	19,449 72
3,500 square yards telford foundation, at 55 cents.....	1,925 00
500 lineal feet tile drain, at 12 cents.....	60 00
Engineering expenses	440 64
Supervisor's salary	410 00
1901 contract as above.....	7,301 06
	<hr/>
Total	\$29,886 42

Maximum grade before	4.92 per cent.
Maximum grade after	3.60 per cent.

We certify the above statement to be correct.

PETER FORMAN,
Engineer.
V. D. KENNY,
JOHN L. ELY,
Supervisors.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find the statement of the cost of building the Squankum and Lakewood gravel road, in Howell township, Monmouth county.

Length of gravel-bed, 24,873 feet, or 4.71 miles.
Width of gravel-bed, 14 feet.
Depth of gravel-bed, 8 inches:

MATERIALS AND WORK.

24,391½ cubic yards excavation.....	
8,600 cubic yards compacted gravel.....	
5,500 feet tile drain.....	
4 acres grubbing	

NOTE.—By a supplemental approved agreement with the contractor the depth of the gravel-bed, for 3.60 miles of the distance, was increased in depth by him by the addition of 2 inches of compacted gravel (1,642 cubic yards) and the full amount and lump sum of his bid allowed, viz.....		\$9,700 00
Engineering expenses		435 00
Supervisor's salary		423 85
Total		\$10,558 85

Maximum grade before	3.10 per cent.
Maximum grade after	1.98 per cent.

We hereby certify the above statement to be correct and that the road is built according to the specifications and agreements.

PETER FORMAN,
Engineer.
CHARLES C. BROWER,
Supervisor.

RED BANK, N. J., November 10th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Red Bank and Oceanic road, township of Shrewsbury, county of Monmouth, State of New Jersey. Total length, 16,844 feet, or 3.19 miles.

Width of stone-bed, 16 feet, with additional width at one turn in road.

Length of stone-bed, 16,844 feet.

Depth of stone-bed, 6 $\frac{4}{10}$ inches.

Number of tons of stone used in construction, 9,036.

Preparation of roadbed (cost) included in price for macadam.....	
Macadam, 29,972 square yards, at 72 cents; total.....	\$21,579 84
Supervisor's salary	234 00
Engineering expenses	647 00
Total	\$22,460 84

Maximum grade before.....	6.7 per cent.
Maximum grade after.....	3.2 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6.4 inches.

Respectfully yours,

W. H. DE NYSE,

Engineer.

JACOB C. SHUTTS,

Supervisor.

MORRISTOWN, N. J., October 31st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of James street or road to New Vernon, townships of Morris and Morristown, county of Morris, State of New Jersey. Total length, 10,705 feet, or 2.03 miles.

Width of stone-bed, 12 and 16 feet.

Length of stone-bed, 10,705 feet.

Depth of stone-bed, 6 inches.

Macadam, 14,963 square yards, at 45 $\frac{1}{2}$ cents; total.....	\$6,808 16
Overhaul, 2,720 cubic yards.....	245 58
Earth excavation, 8,960 cubic yards, at 25 cents; total.....	2,240 00
Cobble gutter	567 99
Rock excavation, 678 cubic yards, at \$1.50; total.....	1,017 00
Tile pipe	184 63
Drain, catch basins and stone drains.....	402 78
Drain, iron pipe.....	162 10
Supervisor's salary	310 50
Engineering expenses	428 65
Total	\$12,457 37

Maximum grade before.....	7.2 per cent.
Maximum grade after.....	3.1 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,
County Engineer.
M. P. NORRIS,
Supervisor.

MORRISTOWN, N. J., October 31st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Newton turnpike from Station 30 to Station 160, township of Randolph, county of Morris, State of New Jersey. Total length, 13,000 feet, or 2.46 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 13,000 feet.
Depth of stone-bed, 6 inches.

Macadam, 17,333.33 square yards, at 36 cents; total.....	\$6,240 00
Overhaul, 27,303 cubic yards.....	3,113 08
Earth excavation, 49,955 cubic yards, at 22 cents; total.....	10,990 10
Rock excavation, 13,238 cubic yards, at \$1; total.....	13,238 00
Drain, stone, 458½ lineal feet, at 10 cents; total.....	45 85
Drain, iron pipe, 16 inches, 396 lineal feet, at \$1.70; total.....	673 20
Supervisor's salary	690 00
Engineering expenses	453 11
Total	\$35,443 34

Mamimum grade before.....	12	per cent.
Maximum grade after	6.33	per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,
County Engineer.
HORACE BAIRD,
Supervisor.

MORRISTOWN, N. J., October 31st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Passaic Valley road, township of Passaic, county of Morris, State of New Jersey. Total length, 22,715 feet, or 4.302 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 22,715 feet.
Depth of stone-bed, 6 inches.



Newton turnpike, Till Hill, Morris Co., during improvement.



Passaic Valley road, Morris Co., before improvement.



Passaic Valley road, Morris Co., after improvement.

Macadam, 30,288 square yards, at 46 cents; total.....	\$13,932 48
Iron pipe, 64 feet 16 inches, at \$1.75, and 64 feet 12 inches, at \$1.25; total	192 00
Overhaul	752 68
Earth excavation, 33,824 cubic yards, at 28 cents; total.....	9,470 72
Rock excavation, 7,484 cubic yards, at \$1.50; total.....	11,226 00
Drain, 1,340 lineal feet, at 18 cents; total.....	241 20
Supervisor's salary	658 50
Engineering expenses	951 25
Total	\$37,424 81

Maximum grade before	10.1 per cent.
Maximum grade after.....	5.05 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,
County Engineer.
CHR. DANWALDER,
Supervisor.

MORRISTOWN, N. J., October 31st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Hamburg turnpike, township of Jefferson, county of Morris, State of New Jersey. Total length, 3,102 feet, or .587 miles.

Width of stone-bed, 14 feet.

Length of stone-bed, 3,256 feet.

Depth of stone-bed, 6 inches.

Number of tons of stone used in construction, 1,425.

Preparation of roadbed (cost).....	\$1,250 16
Macadam, 5,065 square yards, at 45 cents; total.....	2,279 25
Paved gutter, 32 square yards, at 40 cents; total.....	12 80
Cubic yards masonry, 4 cubic yards, at \$3; total.....	12 00
Earth excavation, 3,476 cubic yards, at 33 cents; total.....	1,147 08
Rock excavation, 52 cubic yards, at \$1.90; total.....	98 80
Drain, 32-inch iron pipe, 4 lineal feet, at \$4; total.....	16 00
107 cubic yards overhaul, at 4 cents; total.....	4 28
Supervisor's salary	198 00
Engineering expenses	330 78
Total	\$4,098 99

Maximum grade before	8 per cent.
Maximum grade after	4.33 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,
County Engineer.
C. A. MONKS,
Supervisor.

MORRISTOWN, N. J., November 1st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of portion of Newark and Pompton turnpike, township of Pequannock, county of Morris, State of New Jersey. Total length, 3,721.5 feet, or .70 miles.

Width of stone-bed, 12 feet.
Length of stone-bed, 3,750 feet.
Depth of stone-bed, 6 inches.
Number of tons of stone used in construction, 1,500.

Macadam, 5,000 square yards, at 34½ cents; total.....	\$1,725 00
Rip rap, 280 cubic yards, at 60 cents; total.....	168 00
Earth excavation, 3,815 cubic yards, at 20 cents; total.....	763 00
12-inch iron pipe, 90 lineal feet, at \$1.75; total.....	157 50
Drain tile, 12-inch, 120 lineal feet, at 50 cents; total.....	60 00
Supervisor's salary	165 00
Engineering expenses	140 00
Total	<hr/> \$3,178 50

Maximum grade before. Road practically level.
Maximum grade after. Road practically level.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 6 inches.

Respectfully yours,

WM. E. KING,
County Engineer.
F. T. BUDD,
Supervisor.

POINT PLEASANT, N. J., November 12th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find detailed statement of cost, to date, of West Point Pleasant and Lakewood road, Ocean county, New Jersey, now in course of construction.

SECTION NO. 1.

From West Point Pleasant to Burrsville, length 19,505 feet.

Earth excavation, 28,289 cubic yards, at 16 cents.....	\$4,526 24
Grubbing, 3 acres, at \$25.....	75 00
Embankments turfed, 5,968 square yards, at 20 cents.....	1,193 60
	<hr/>
	\$5,794 84

SECTION NO. 2.

From Burrsville to west entrance of Ocean County Golf Club, length 20,605 feet.

Earth excavation, 13,105 cubic yards, at 14 cents.....	\$1,834 70
Grubbing, $\frac{1}{2}$ acre, at \$30.....	15 00
Compacted gravel, 5,500 cubic yards, at \$1.40.....	7,700 00
Extra compacted gravel, 833 $\frac{4}{7}$ cubic yards, at \$1.40.....	1,166 28
	<hr/>
	\$10,715 98

I hereby certify the foregoing statement to be correct.

WILLIAM SEGOINE.

Engineer.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Hamburg turnpike and Oakland road, township of Wayne, county of Passaic, State of New Jersey. Total length, 8,974 feet, or 1.70 miles.

Width of stone-bed, 16 feet.

Length of stone-bed, 8,974 feet.

Depth of stone-bed, 4 inches.

Macadam, 16,453 square yards, at 22 cents; total.....	\$3,619 66
44 $\frac{1}{2}$ cubic yards rubble masonry, at \$1.75.....	77 88
200 lineal feet blue-stone coping, at \$1 per lineal foot.....	200 00
Earth excavation, 11,701 $\frac{1}{2}$ cubic yards, at 22 cents; total.....	2,574 33
Rock excavation, 2,202 cubic yards, at \$1.25; total.....	2,752 50
Drain, cast-iron pipe (12-inch), 164 lineal feet, at \$1.90; total...	311 60
12-inch vitrified pipe, 66 lineal feet, at 75 cents; total.....	49 50
	<hr/>
Total.....	\$9,585 47

Maximum grade before 9 per cent.

Maximum grade after 6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

WM. L. WHITMORE,
Engineer.
WM. COLFAX,
Supervisor.

November 26th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Laurel street and Crosby avenue road, city of Paterson, county of Passaic, State of New Jersey. Total length, .57 miles.

Width of stone-bed, 22 feet.
Length of stone-bed, 3,010 feet.
Depth of stone-bed, 4 inches.

Macadam, 7,460 square yards, at 19 cents; total.....	\$1,417 40
Paved gutter, 47 square yards, at 60 cents; total.....	23 20
1 catch basin.....	25 00
Earth excavation, 619 cubic yards, at 25 cents; total.....	94 75
Drain, 42 lineal feet, at 50 cents; total.....	21 00
Total	<hr/> \$1,586 35

Maximum grade before..... 8 per cent.
Maximum grade after..... 5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches, which must be and was ascertained by plugging not less than every 500 feet and measuring from the surface of the earth foundation to a line stretched across the road from the top of the grade stakes.

Respectfully yours,

WILLIAM L. WHITMORE,
Engineer.
C. H. JAMES,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Naacht-punk road, townships of Manchester and Wayne, county of Passaic, State of New Jersey. Total length, 18,500 feet, or 3.50 miles.

Width of stone-bed, 16 feet.
Length of stone-bed, 18,500 feet.
Depth of stone-bed, 4 inches.

3,577 square yards bottom stone, at 25 cents; total.....	\$894 25
Macadam, 32,964 square yards, at 16½ cents; total.....	5,439 06
Dry wall, 776 cubic yards, at \$2; total.....	1,552 00
Rubble masonry, 84 cubic yards, at \$2.25; total.....	189 00
Earth excavation, 19,772 cubic yards, at 17 cents; total.....	3,361 24
Earth fill, 3,049 cubic yards, at 45 cents; total.....	1,372 05
Rock excavation, 574 cubic yards, at \$1; total.....	574 00
288 trees removed, at \$4; total.....	1,152 00
Extra work taking up and relaying pipe.....	50 00

Total \$14,583 60

Maximum grade before..... 9 per cent.
Maximum grade after..... 6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

W. L. WHITMORE,

Engineer.

JOHN L. OCHS,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Highland avenue, township of Acquackanonk and city of Passaic, county of Passaic, State of New Jersey. Total length, 4,275 feet, or .80 miles.

Width of stone-bed, 16 feet.

Length of stone-bed, 4,275 feet.

Depth of stone-bed, 4 inches.

Macadam, 7,610 square yards, at 23 cents; total.....	\$1,750 39
Earth excavation, 7,538 cubic yards, at 21 cents; total.....	1,582 98
Drain, 12-inch vitrified, 100 lineal feet, at 80 cents; total.....	80 00
Drain, 18-inch vitrified, 50 lineal feet, at \$1; total.....	50 00

Total \$3,463 28

Maximum grade before..... 8 per cent.
Maximum grade after..... 4 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 4 inches.

Respectfully yours,

WILLIAM L. WHITMORE,

Engineer.

ANTON SANDKNOP,

Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Skillman road, township of Montgomery, county of Somerset, State of New Jersey. Total length, 13,200 feet, or 2½ miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 13,200 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 6,778½.

Macadam, 18,312 square yards, at 54 cents; total.....	\$9,888 48
Earth excavation, 10,893 cubic yards, at 30 cents; total.....	3,287 90
Drain, 8,700 lineal feet, at 15 cents; total.....	1,305 00
Supervisor's salary	355 00
Engineering expenses	431 78
Total	<u>\$15,248 16</u>

Maximum grade before..... 11 per cent.

Maximum grade after, quite level except 500 feet, which is..... 8 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,

Engineer.

E. C. TAGGART,

Supervisor.

SOMERVILLE, N. J., November 5th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Conover's Corner and Liberty School-House road, township of Hillsborough, county of Somerset, State of New Jersey. Total length, 17,830 feet, or 3.38 miles.

Width of stone-bed, 12 feet.

Length of stone-bed, 17,830 feet.

Depth of stone-bed, 8 inches.

Number of tons of stone used in construction, 9,012.

Macadam, 24,239 square yards, at 57 cents; total.....	\$13,816 23
Purchasing and hauling clay.....	100 00
Gravel change of grade at Bolmas.....	42 00
Earth excavation, 14,534 cubic yards, at 23 cents; total.....	3,342 82
Drain, 17,823 lineal feet, at 15 inches; total.....	2,673 45
Supervisor's salary	486 00
Engineering expenses	893 48
Total	<u>\$21,353 98</u>



Conover's Corner and Liberty School House, Somerset Co., after improvement.



Conover's Corner and Liberty School House, Somerset Co., after improvement.

Maximum grade before..... 9½ per cent.
Maximum grade after..... 6 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

JOSHUA DOUGHTY, JR.,
Engineer.
JAMES F. AUTEN,
Supervisor.

November 1st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Union avenue, Elizabeth avenue and Orange avenue, township of Cranford, county of Union, State of New Jersey. Total length (2,761), (1,347), (2,110), 6,218 feet, or 1.178 miles.

Width of stone-bed, Union avenue, 20 feet; Elizabeth and Orange avenues, 12 feet.

Length of stone-bed, 6,218 feet.

Depth of stone-bed, Union avenue, 12 feet of 6-inch, 8 feet of 4-inch; Elizabeth and Orange avenues, 6 inches.

Macadam, 6-inch, 7,793 square yards, at 50 cents; total.....	\$3,896 50
Macadam, 4-inch, 2,390 square yards, at 40 cents; total.....	956 00
Macadam, 2-inch, dressing, 405 square yards, at 30 cents; total....	121 50
Earth excavation, 4,025 cubic yards, at 30 cents; total.....	1,207 50
Manholes and flush tanks lowered, 8, at \$5; total.....	40 00
Culverts lowered, 5, at \$25; total.....	125 00
Drain, 700 lineal feet, at 18 cents; total.....	126 00
Shade trees reset on Orange avenue.....	10 00
Supervisor's salary	200 00
Advertising expenses	50 16
Engineering expenses	388 95
Total	\$7,121 61

Maximum grade before..... 5.5 per cent.
Maximum grade after..... 4.3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was as above.

Respectfully yours,

JACOB L. BAUER,
Engineer.
JOHN MOLONY,
Supervisor.

November 1st, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Walnut avenue, township of Cranford, county of Union, State of New Jersey. Total length, 5,087 feet, or .963 miles.

Width of stone-bed, 1,600 feet of 20 feet; 3,487 feet of 12 feet.
 Length of stone-bed, 5,087 feet.
 Depth of stone-bed, 20-foot section, 12 feet of 6-inch, 8 feet of 4-inch; 12-foot section, 6 inches.

Macadam, 6-inch, 6,735 square yards, at 50 cents; total.....	\$3,367 50
Macadam, 4-inch, 1,404 square yards, at 40 cents; total.....	561 60
Earth excavation, 3,302 cubic yards, at 30 cents; total.....	990 60
Manholes and flush tanks to be lowered, 9, at \$5; total.....	45 00
Culverts to be lowered, 2, at \$25; total.....	50 00
Advertising expenses	50 16
Supervisor's salary	100 00
Engineering expenses	300 88
Total	\$5,465 74

Maximum grade before..... 2.3 per cent.
 Maximum grade after..... 2.3 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was as above.

Respectfully yours,

JACOB L. BAUER,

Engineer.

ISAAC WINANS,

*Supervisor.**Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:*

DEAR SIR—Below find an exact detailed statement of the cost of the continuation of Morris turnpike, townships of Franklin and Greenwich, county of Warren, State of New Jersey. Total length, 33,400 feet, or 6.33 miles.

Width of stone-bed, 14 feet.
 Length of stone-bed, 33,204 feet.
 Depth of stone-bed, 8 inches (loose stone).

25,825.96 square yards macadam, at 57 cents.....	\$14,720 80
25,825.97 square yards macadam, at 56 cents.....	14,462 54
22,051 cubic yards earth excavation, at 21 cents.....	4,630 71
975 cubic yards, rock excavation, at 75 cents.....	731 25
200 lineal feet stone drain, at 10 cents.....	20 00
30 lineal feet 20-inch tile pipe, at \$2.....	60 00
458 lineal feet 16-inch tile pipe at \$1.30.....	595 40
242 lineal feet 12-inch tile pipe, at \$1.10.....	266 20
66 lineal feet 20-inch iron pipe, at \$3.10.....	204 60
834 lineal feet 16-inch iron pipe, at \$2.....	1,668 00
452 lineal feet 12-inch iron pipe, at \$1.75.....	791 00
Engineering expenses	530 95
Supervisor's salary	396 00
Total	\$39,077 45

Maximum grade before..... 10.8 per cent.
Maximum grade after..... 8 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

WILLIAM E. KING,
Engineer.
CHARLES OBERY,
Supervisor.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of the Blairstown road, township of Blairstown, county of Warren, State of New Jersey. Total length, 5, 500 feet, or 1.04 miles.

Width of stone-bed, 1,900 feet, 16 feet; 3,600 feet, 14 feet.
Length of stone-bed, 5,500 feet.
Depth of stone-bed, 8 inches (loose stone).

Macadam, 8,977.77 square yards, at 71 cents; total.....	\$6,374 22
Earth excavation, 5.106 cubic yards, at 27 cents; total.....	1,378 62
Rock excavation, 31¼ cubic yards, at \$1.10; total.....	34 37
Drain, iron pipe, 277 lineal feet, at \$1.40; total.....	387 80
Drain, 12-inch tile, 96 lineal feet, at \$1; total.....	96 00
Supervisor's salary	264 00
Engineering expenses	160 29
Total	\$8,695 30

Maximum grade before..... 10 per cent.
Maximum grade after..... 5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

W. E. KING,

Engineer.

J. F. BUNNELL,

Supervisor.

WASHINGTON, N. J., September 13th, 1902.

Mr. Henry I. Budd, State Commissioner of Public Roads, Trenton, New Jersey:

DEAR SIR—Below find an exact detailed statement of the cost of Washington avenue, Belvidere avenue and Broad street, borough of Washington, county of Warren, State of New Jersey. Total length, 7,509 feet, or 1.422 miles.

Width of stone-bed, sections 1, 2 and 4, 14 feet.

Width of stone-bed, section 3, 31.41 feet.

Length of stone-bed, sections 1, 2 and 4, 6,607 feet.

Length of stone-bed, section 3, 902 feet.

Depth of stone-bed, 8 inches (loose stone).

Macadam, 13,425.53 square yards, at 59 cents; total.....	\$7,921 06
Earth excavation, 3,665 cubic yards, at 25 cents; 694 cubic yards, at 23 cents; total.....	1,075 87
Rock excavation, 95½ cubic yards, at \$1.50 cents; total.....	143 25
Drain, 1,070 lineal feet, at 12 cents; total.....	128 40
Supervisor's salary	282 00
Engineering expenses	148 10
Total	\$9,698 68

Maximum grade before..... 9 per cent.

Maximum grade after..... 5 per cent.

We hereby certify the above statement to be correct, and that the pavement was constructed strictly according to the specifications, and that the depth of finished pavement was 8 inches.

Respectfully yours,

WM. E. KING,

Engineer.

SAM'L S. STEWART,

Supervisor.



East Washington ave., Washington, Warren Co., before improvement.



East Washington ave., Washington, Warren Co., after improvement.

APPENDICES.

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(145)

APPENDIX A.

Standard State Aid Specifications for Stone Roads as Amended by the State and County Road Engineers, February 1st, 1901.

SPECIFICATIONS.

For a road in.....County, New Jersey, known as
.....beginning at.....
and extending to.....a distance of
.....feet, or.....miles,
.....feet wide.

WORK TO BE PERFORMED.

1. The work to be performed will consist in furnishing all materials, tools, machinery and labor necessary for the efficient and proper grading of roadway, side ditches and side banks; laying, spreading, rolling of road metal, and leaving the roadway complete in every manner ready for immediate use.

PLANS AND DRAWINGS.

2. The plan, profile and cross-sections on file in the office of the State Commissioner of Public Roads and at the office of.....
.....County Engineer.....
New Jersey, show general location, profile, details and dimensions. The work will be constructed in all respects according to the above-mentioned plans, profile and cross-sections, which form part of these specifications.

3. Any variation of location, profile, size and dimensions from that shown on the plans, as may be required by the exigencies of construction, will, in all cases, be determined by the engineer; but the contractor shall not, on any pretense, save that of the written order of the contracting parties, deviate from the intent of the plans or specifications.

4. On all drawings, figured dimensions are to govern in cases of discrepancy between scale and figures.

GRADING.

5. Under this head will be included all excavation and embankment required for the formation of the highway; cutting all ditches or drains about or contiguous to the road; removing all fences, walls, buildings, trees, poles or other incumbrances, the excavation and embankment necessary for reconstructing cross or branch roads in cases where they are destroyed or interfered with in the formation of the roadway, and all other excavations and embankments connected with or incidental to the construction of the said road.

EXCAVATION.

6. The roadway to the width of.....as shown on plan must be excavated or built to the same curvature as that of the surface of the road when finished; the grade, from center to sides, must be as shown on plans.

7. The earth taken away from any cut or ditch shall be deposited where the engineer may direct, either within or without the lines of the road, but no earth shall be removed from the line of the road without the order of the engineer.

EMBANKMENT.

8. Material taken from the excavations, except when otherwise directed by the engineer, shall be deposited in the embankment, either on the roadway or sidewalks.

9. When there is not sufficient material in the excavations of the road to form the embankments, the deficiency must be supplied by the contractor from without the road. The character of said material and place of excavation must be approved by the engineer. Said material is to be paid for at the same price per cubic yard as specified in the contract for other excavation.

10. The embankments will be formed in layers of such depth, generally twelve (12) inches, and the material deposited and distributed in such manner as the engineer may direct, the required allowance for settling being added.

SLOPES.

11. Slopes in both embankments and excavations shall be one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical, unless otherwise ordered by engineer.

ROADWAY.**Sub-Foundations.**

12. When the excavations and embankments have been brought to a proper depth below the intended surface of the roadway, the cross-section thereof conforming in every respect to the cross-section of the road when finished, the same shall be rolled with a.....ton.....roller until approved by the Engineer and Supervisor. If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted, and the whole re-rolled until thoroughly solid and to above-mentioned grade. Water must be applied in advance of the roller, when, in the opinion of the engineer and supervisor, it is necessary.

STONE CONSTRUCTION.**Telford Foundations.**

13. After the roadbed has been formed and rolled, as above specified, and has passed the inspection of the engineer and supervisor, a bottom course of stone, of an average depth of.....inches, is to be set by hand as a close, firm pavement, the stones to be placed on their broadest edges lengthwise across the road in such manner as to break joints as much as possible, the breadth of the upper edge not to exceed four (4) inches. The interstices are then to be filled with stone chips, firmly wedged by hand with a hammer, and projecting points broken off. No stone of greater length than ten (10) inches or width of four (4) inches shall be used, except each alternate stone on outer edge, which shall be double the length of the others and well tied into the bed of the road; all stones with a flat, smooth surface must be broken; the whole surface of this pavement to be subjected to a thorough settling or ramming with heavy sledge hammers, and thoroughly rolled with a.....ton.....roller. No stone larger than two and one-half ($2\frac{1}{2}$) inches to be left loose on top of telford.

MACADAM.**First Course of Broken Stone.**

14. After the roadbed has been formed and rolled as above specified, and has passed the inspection of the engineer and supervisor, the first layer of broken stone, consisting of two and one-half ($2\frac{1}{2}$) inch stone, or stone that will pass through a ring three (3) inches in diameter, shall be

deposited in a uniform layer, having a depth of.....inches, and rolled repeatedly with a.....ton.....roller until compacted to the satisfaction of the engineer and supervisor. No stone in this course shall be less than two (2) inches in length. Water must be applied in advance of the roller, when, in the opinion of the engineer and supervisor, it is necessary.

15. The depth of loose stone in this and all other courses must be measured by blocks the required thickness of the said loose stone. These blocks to be placed at frequent intervals amid the loose stone when being spread.

BINDER BETWEEN FIRST AND SECOND COURSE FOR TELFORD OR MACADAM.

16. On the first course of stone a quantity of.....binder shall be spread in a uniform layer, and the rolling continued until the stones cease to sink or creep in front of the roller; water will be applied in advance of the roller, if ordered by the engineer. The quantity and quality of this and all other binding to be at all times subject to the approval of the engineer and supervisor.

SECOND COURSE OF BROKEN STONE FOR MACADAM OR TELFORD.

17. The second course of broken stone shall consist of one and one-half ($1\frac{1}{2}$) inch stone; that is, every piece of stone shall be broken so that it can be passed through a ring two (2) inches in diameter, and no stone shall be more than two (2) inches or less than one (1) inch long. This course is to be spread in a uniform layer of.....inches in depth, and rolled until thoroughly settled into place to the satisfaction of the engineer and supervisor. Water will be applied if ordered by the engineer and supervisor.

BINDER ON SECOND COURSE OF STONE.

18. Binder on this course of stone must be applied in the same manner as binder on first course of stone (see Art. 16), as directed by engineer and supervisor.

SURFACE.

19. When the two courses are rolled to the satisfaction of the engineer and supervisor, a coat of fifty (50) per cent. of three-quarters ($\frac{3}{4}$) inch stone and fifty (50) per cent of screenings, properly mixed, is to be spread of sufficient thickness to make a smooth and uniform surface to the road; then again rolled until the road becomes thoroughly consolidated, hard and smooth.

20. Rolling to be done by contractor with a.....ton..... roller approved by the engineer.

21. Any depression formed during the rolling, or from any other cause, are to be filled with.....stone and screenings approved by the engineer, and the roadway brought to a proper grade and curvature as determined by him.

22. Water to be applied in such quantity and in such manner as directed by the engineer and supervisor.

MANNER OF ROLLING.

23. In the rolling the roller must start from the side lines of the stone-bed and work towards the center, unless otherwise directed. The rolling shall at all times be subject to the directions of the engineer and supervisor, who may, from time to time, direct such methods of procedure as in their opinion the necessities of the case may require.

QUALITY OF MATERIAL.

24. All stone must be as nearly cubical as possible, broken with the most approved modern stone crushing machinery, free from all screenings, earth and other objectionable substances, of uniform size, and the same kind and quality, or equally as good in every particular, as that shown in the engineer's office. The one and one-half ($1\frac{1}{2}$) inch stone, three quarters ($\frac{3}{4}$) inch and screenings for binder and final finish must be of the best trap-rock, free from loam or clay,

25. The contractor must furnish samples to the engineer of the kind of stone to be used in the work before the opening of the bids,

26. A shoulder of firm earth or gravel is to be left or made on each side, extending at the same grade and curvature of road to side ditches or gutters. This shoulder is to be rolled according to the directions of the engineer.

SIDE DITCHES OR GUTTERS.

27. The side ditches or gutters are to be excavated as per stakes furnished by the engineer, in order to give an easy flow of water, so that no water shall be left standing on the road or in ditches, for all of which no extra payment will be made.

UNDERDRAINS.

28. Underdrains, if found necessary, shall be constructed by the contractor (at prices named in bids) of good four (4) inch.....tile, laid upon a board of not less than one (1) inch in thickness and six (6) inches in width, whenever and wherever the engineer and supervisor shall decide; top of tile or pipe must be at least.....inches deep, unless otherwise directed by the engineer; the joints of the tile or pipe must be covered with salt hay, or material equally as good, and trench filled with pervious earth.

29. When directed by the engineer a stone drain may be used in place of the tile drains. A trench one foot in width and one foot six inches in depth shall be excavated below the sub-grade, said excavation to be filled with loose broken stone to a depth required by engineer.

NO EXTRA PRICE.

30. No allowance in measure of depth of pavement will be made on account of any material which may be driven into the roadbed by rolling. The pavement, when completed, must conform to the grade and cross-section and be satisfactory to the engineer, whose decision shall be final.

31. No extra work will be paid for unless the price has been agreed upon between the contracting parties, including the State Commissioner of Public Roads, and endorsed upon the agreement, witnessed by the engineer.

32. All clay or gravel for shouldering or binder and all extra hauling is to be done at the contractor's expense.

BIDS.

33. Bids will be received under these specifications for the road complete. The prices per yard for excavation, telford, macadam, &c., are intended for the use of the engineer in making estimates to the Board of Chosen Freeholders of work done. No bids will be received in which all of the following items are not filled out:

- (1) Price per cubic yard for earth excavations, without classification, as per cross-sections throughout the length and width of the road.
- (2)
- (3) Price per square yard for telford road complete.
- (4) Price per square yard for macadam road complete.
- (5) Price per lineal foot for underdrains, furnishing all labor and material.
- (6) Price (lump) for the whole road complete, according to above specifications and plans.

ESTIMATES OF QUANTITIES.

34. (1) Excavation, earth.....cubic yards.
- (2)
- (3) Telford.....square yards, as specified.
- (4) Macadam.....square yards, as specified.
- (5) Underdrains.....lineal feet.
- (6)

35. These quantities are result of calculation, but are to be considered as approximate. The county will not be responsible for any excess in above quantities, should any occur. The contractor is expected to satisfy himself, by a personal examination of the work contemplated, about the nature, character and quantity of the labor and material required.

BOND ACCOMPANYING BIDS.

36. Bids shall be accompanied with the bidder's bond in the sum of one thousand dollars, with security satisfactory to the Board of Chosen Freeholders, conditioned that if the contract shall be awarded to him he will, when required by said Board, execute an agreement in writing to perform the work according to the specifications.

LIABILITIES OF CONTRACTOR.

37. He shall maintain sufficient guards by day and night to prevent accidents from travel, and will be liable for any damage which may arise from his neglect to do so, or from any omission on his part.

38. He shall keep the road sprinkled until the final certificate of completion by the engineer is given.

39. He is to commence and prosecute the work upon the road at such points as may be directed by the engineer, within.....days from and after the signing of the contract, and shall continue work thereon until completion, except as herein provided.

40. He further agrees to complete the same on or before the.....day of.....A. D.....

Twenty dollars for each day that the work shall remain uncompleted, after the time allowed by contract, may be deducted, as liquidated damages, from any moneys due contractor, unless otherwise agreed upon by the Board of Chosen Freeholders, after presentation of certificate of the engineer recommending the extension of the time limit of completion. A bonus or premium of one dollar per week will be paid the contractor for each week the road is completed before the time specified in the contract.

41. The contractor shall keep the finished roadway and earthwork in repair for the period of one year from the date of its completion and

acceptance, during which time he shall be liable for wear and tear caused by ordinary travel, and in addition thereto for as much longer as for any period or periods during said year it shall be out of proper condition. If, during that time, the roadway or any part of the work shall, in the judgment of the engineer and Board of Chosen Freeholders, require repairing and they shall duly notify the contractor to make such repairs as required, and the contractor should refuse or neglect to do so to the satisfaction of the said engineer and Board of Chosen Freeholders within five days from the date of service of notice, then the said engineer and Board of Chosen Freeholders shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

42. The contractor will be required to preserve all stakes and bench marks made and established on the line of work until duly authorized by the engineer to remove the same.

43. The contractor shall not disturb the position of title stones (the corners of properties adjacent to the road), but where they appear he will either lift or lower them, under the personal supervision of the engineer.

44. The contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary he must construct safe and commodious crossings, to be maintained in good order. He shall afford all proper and reasonable means for the accommodation of the public, and leave the roadway complete in every manner ready for immediate use.

PROVISION FOR DRAINAGE.

45. If it is necessary in the prosecution of the work to interrupt or obstruct the natural drainage of the surface, or the flow of artificial drains, the contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. He shall be held liable for all damages which may result from any neglect to provide for either natural or artificial drainage which he may have interrupted.

RIGHT TO BUILD BRIDGES, CULVERTS, ETC., AND SUSPENSION OF WORK.

46. The right of the county to build bridges, culverts, lay pipes or other appurtenances in said road during the progress of the work, is expressly reserved, as well as suspending the work or any part thereof during the construction of the same, for the purposes above stated, without further compensation to the contractor for such suspension than an extension of time for completing the work as much as it may have been delayed.

STOPPING WORK ON ACCOUNT OF WEATHER.

47. The engineer or supervisor may stop any portion of the work if in their judgment the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage, except an extension of time for the completion of the work as herein provided.

ABANDONMENT OF CONTRACT.

48. If at any time the work under contract should be abandoned, or if at any time the engineer should judge and so certify in writing that said work, or any part thereof, is unnecessarily delayed, or that the contractor is willfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, then, and in that case, the Board of Chosen Freeholders shall notify the said contractor to discontinue all work under this contract. They may employ other parties to complete the work in such manner as they may decide, and use such material as may be procured upon the line of aforesaid work, and if necessary, to procure other material for its completion, and charge the expenses of the said labor and material to the contractor, which expense shall be deducted from any moneys due him under contract. In case these expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said contractor, he or his bondsmen shall pay the amount of excess to the Board of Chosen Freeholders on notice from the engineer.

ENGINEER.

49. The engineer is to be selected or appointed by the Board of Chosen Freeholders and paid by them. He is to furnish all surveys, profiles, plans, specifications and estimates of quantities of all kinds before specifications are signed, and in such a clear manner that lump bids can be made upon the work. He shall furnish all lines and grades required for the completion of the work. He is to furnish estimates for quantities of work done before partial payments can be made, the quantity of road laid being determined by surface measurements. Should any difference arise between the contracting parties as to their meanings, his decisions on these matters are to be final and conclusive. The work is to be done according to his directions, and if any material of which he does not approve is brought upon the road, it is to be removed at the expense of the contractor. If the contractor fails or neglects to do any part of the work as specified, or as directed by the engineer, then in that case all other work shall be discontinued on notice from the engineer to

the contractor, or to the superintendent or foreman in charge of the work for the contractor, until such time as the work complained of has been done to the satisfaction of the engineer; and the contractor will not be entitled to or allowed any compensation or extension of time for such discontinuation or suspension of the work.

SUPERVISOR.

50. Nothing in these specifications relating to the duties of the engineer shall be taken or construed in any manner to conflict with the duties of the supervisor, as specifically set forth in the act entitled "An act to provide for the more permanent improvement of the public roads of this State," approved March 22d, 1895, and the acts supplementary thereto, but they shall co-operate as far as practicable.

INCOMPETENT WORKMEN.

51. The contractor shall employ competent men to do the work, and whenever the supervisor shall inform him or his representative in charge, in writing, that any man on the work is unfitted for the place, or is working contrary to the provisions of the specifications or the instructions of the engineer and supervisor, he shall thereupon be discharged.

INSPECTION.

52. All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the engineer and supervisor.

53. All material and workmanship of any kind shall be subject at all times to the inspection of the engineer and supervisor. Whenever unfaithful and imperfect work is discovered, it shall be immediately repaired or replaced by the contractor, after due notification from the engineer and supervisor.

SUB-LETTING OF CONTRACT.

54. The contractor shall not assign or sub-let any portion of this contract without the consent of the Board of Chosen Freeholders and the State Commissioner of Public Roads.

PAYMENTS.

55.monthly payments will be made by the Board of Chosen Freeholders to the contractor for work performed, upon presentation by him of the proper certificates of the engineer and supervisor, in a sum not to exceed eighty per cent. of the amount then due, together with releases from all liens, if required. Fifteen per cent. will be paid at the completion of the work. The remainder of five per cent. will be retained by the Board of Chosen Freeholders for a period of one year, as provided for in Article 41.

BOND OF CONTRACTOR.

56. The contractor will be required to execute, within five days of giving of contract, a bond in such sum and with such securities as shall be approved by the Board of Chosen Freeholders, conditioned for the faithful performance of the contract, to indemnify and save harmless the said Board of Chosen Freeholders from all suits or actions of any name or description brought against them on account of any act or omission of the contractor or his agents, and for the faithful performance of the contract by the contractor. Said bond shall be in a sum of not less than fifty per cent. of the cost of the road when completed. Any change made in said plans, specifications, agreements or quantities without the consent of the bondsmen shall in no way vitiate said bond. The said contractor hereby further agrees that so much of the money due him, under and by virtue of this agreement, as shall be considered necessary by the Board of Chosen Freeholders, may be retained by them until all such suits or claims for damages aforesaid shall have been settled and evidence to that effect furnished to the satisfaction of the said Board of Chosen Freeholders.

CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL,
ETC., ON FINAL ESTIMATE.

57. The contractor must also furnish said engineer and supervisor with satisfactory evidence that all persons who did work or furnished material for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work, have been duly paid or secured; he shall also give notice to said engineer and supervisor within ten days after the completion of the work, and before final estimate is made, that any balance for such work or materials, or compensation for such damages due, has been fully paid or released.

NINTH ANNUAL REPORT.

The right to increase or decrease the quantity of work and to reject any or all bids is reserved.

.....
County Engineer.

.....
Road Committee.

Approved this.....A. D.
.....by resolution of the Board of Chosen Freeholders.

.....
Director Board of Chosen Freeholders.

.....
Clerk of Board of Chosen Freeholders.

Office State Commissioner of Public Roads, Trenton, N. J.

I have this day carefully read and examined the foregoing specifications, and the same are hereby approved.

Any departure from these specifications which increases the cost of the road must have the written consent of the State Commissioner of Public Roads.

Given under my hand, this.....A. D.....

.....
State Commissioner of Public Roads.

PROPOSAL.

*To the Board of Freeholders of the County of.....State of
New Jersey:*

Gentlemen—The undersigned hereby declares that he has carefully examined the annexed specifications and the drawings therein referred to, and will provide all necessary machinery, tools, apparatus and other means of construction, and do all the work and furnish all the material called for by said specifications, in the manner prescribed by the specifications and the requirements of the Engineer and Supervisor under them for the following prices:

- (1) Price per cubic yard for earth excavations, without classification, as per cross-sections throughout the length and width of the road.
- (2)
- (3) Price per square yard for telford road complete.
- (4) Price per square yard for macadam road complete.
- (5) Price per lineal foot for underdrains, furnishing all labor and material.
- (6) Price (lump) for the whole road complete, according to above specifications and plans.

Accompanying this proposal is an approved bond for the sum of one thousand dollars (\$1,000), payable to the order of.....
.....County Collector of.....county;
which bond is to be forfeited as liquidated damages if, in case this proposal is accepted, the undersigned shall fail to execute a contract with said Board of Freeholders, under the conditions of this proposal, within the time provided for by the foregoing advertisement for proposals; otherwise, said bond is to be returned to the undersigned.

Signed.....

Address.....

.....N. J.....

CONTRACT.

This agreement, made the.....day of
.....in the year of our Lord one thousand nine
hundred.....between The Board of Chosen Freeholders of
the County of.....party of the first part, and
.....party of the second part,

Witnesseth, That the said party of the second part, for and in consid-
eration of the payments hereinafter specified and agreed to be made by
the party of the first part, hereby covenant and agree to furnish and
deliver all the materials and to do and perform all the work and labor
required to be furnished and delivered, done and performed in and about
the macadamizing of.....
beginning at.....
and extending to.....
in the township of.....a distance of.....
in strict and entire conformity with the plans on file in the engineer's
office and with the specifications hereto annexed and duly approved by
resolution of The Board of Chosen Freeholders of the County of.....
adopted the.....day of.....in the year
of our Lord one thousand nine hundred.....and approved by
the State Commissioner of Public Roads on the.....day of
.....in the year of our Lord one thousand nine hun-
dred.....which said plans and specifications are hereby made part
of this agreement as fully and with the same effect as if the same had
been set forth at length in the body of this agreement.

In consideration of the premises, the party of the first part hereby
agrees to pay to the party of the second part for said work, when com-
pleted, in accordance with the said specifications, the sum of.....
payments to be made as provided in said specifications upon presentation
of the proper certificates of the engineer and supervisor, and upon the
terms set forth in the annexed specifications.

This contract to be binding upon The Board of Chosen Freeholders
of the County of.....their successors or assigns and
upon
the party of the second part.....

In Witness Whereof, The Director of The Board of Chosen Freeholders
of the County of.....by authority of a resolution of
said Board, hath hereunto set his hand and affixed the corporate seal of
the said Board, and the said party of the second part ha....hereunto set
.....hand and seal the day and year first above written.

Signed, sealed and delivered in the presence of

.....

(This bond to be filled out and to accompany bid.)

KNOW ALL MEN BY THESE PRESENTS, That we,.....

are held and firmly bound unto The Board of Chosen Freeholders of the
County of,.....**in the sum of One Thousand Dollars,**
lawful money of the United States of America, to be paid to the said
The Board of Chosen Freeholders of the County of,.....**their**
successors and assigns, for which payment, well and truly to be made,
we bind ourselves, our and each of our heirs, executors and adminis-
trators, jointly and severally, firmly by these presents.

Sealed with our seals and dated the,.....**day of**
**in the year of our Lord one thousand nine**
hundred,.....

Whereas, The above bounden,.....
has made a proposal to The Board of Chosen Freeholders of the County
of,.....**in writing, bearing date the,**.....
day of,.....**in the year of our Lord one thousand nine**
hundred,.....

and being hereto annexed, for doing all the work and furnishing all the
materials for the permanent improvement of the,.....
road in the said County of,.....**pursuant to an advertise-**
ment published in the,.....**on the,**.....
day of,.....**one thousand nine hundred,**.....

Now the Condition of the Obligation is Such, That, in case the contract
for which said proposal is made shall be awarded to the said,.....

.....
and if,....**shall, when required by the said Board, execute an agreement**
to perform the said work and furnish said materials according to the
specifications annexed to said proposal, then this obligation shall be void,
or otherwise shall remain in full force and virtue.

Signed, sealed and delivered in the presence of

**Standard State Aid Specifications for Gravel Roads as
Amended by the State and County Road
Engineers, February 1st, 1901.**

SPECIFICATIONS.

For a GRAVEL ROAD in.....County, New Jersey,
known as.....beginning at.....
and extending to.....a distance
of.....feet, or.....miles.

WORK TO BE PERFORMED.

The work to be performed will consist in furnishing all tools, machinery, and labor necessary for the efficient and proper grading of roadway, side ditches and side banks; laying, spreading and rolling of road material, and leaving the roadway complete in every manner ready for immediate use.

PLANS AND DRAWINGS.

The plans, profile and cross-sections on file in the office of the State Commissioner of Public Roads and at the office of.....County Engineer.....New Jersey, show general location, profile, details and dimensions. The work will be constructed in all respects according to the above-mentioned plans, profile and cross-sections, which form part of these specifications.

Any variation of location, profile, size and dimensions from that shown on the plans, as may be required by the exigencies of construction, will, in all cases, be determined by the engineer; but the contractor shall not, on any pretense, save that of the written order of the contracting parties, deviate from the intent of the plans or specifications.

On all drawings, figured dimensions are to govern in cases of discrepancy between scale and figures.

GRADING.

Under this head will be included all excavations and embankments required for the formation of the highway; cutting all ditches or drains about or contiguous to the road; removing all fences, walls, buildings, trees, poles or other incumbrances, the excavation and embankment

necessary for reconstructing cross or branch roads in cases where they are destroyed or interfered with in the formation of the roadway, and all other excavations and embankments connected with or incidental to the construction of the said road.

EXCAVATION.

The roadway to the width of.....as shown on plan must be excavated or built to the same curvature as that of the surface of the road when finished; the grade, from center to sides, must be as shown on plans.

The earth taken away from any cut or ditch shall be deposited where the engineer may direct, either within or without the lines of the road, but no earth shall be removed from the line of the road without the order of the engineer.

EMBANKMENT.

Material taken from the excavations, except when otherwise directed by the engineer, shall be deposited in the embankments, either on the roadway or sidewalks.

When there is not sufficient material in the excavations of the road to form the embankments, the deficiency must be supplied by the contractor from without the road. The character of said material and place of excavation must be approved by the engineer. Said material is to be paid for at the same price per cubic yard as specified in the contract for other excavation.

The embankments will be formed in layers of such depth, generally twelve (12) inches, and the material deposited and distributed in such manner as the engineer may direct, the required allowance for settling being added.

SLOPES.

Slopes in both embankment and excavation shall be one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical, unless otherwise ordered by the engineer.

ROADWAY.

Sub-Foundations.

When the excavations and embankments have been brought to a proper depth below the intended surface of the roadway, the cross-section conforming in every respect to the cross-section of the road when finished, the same shall, if ordered by the engineer, be rolled until approved by

him. If any depressions form under such rolling, owing to improper material or vegetable matter, the same shall be removed and good earth substituted, and the whole re-rolled until thoroughly solid and to above-mentioned grade.

SHOULDERING.

A shoulder of firm earth or gravel is to be left or made on each side of the gravel bed, extending at the same grade and curvature of road to side ditches or gutters. This shoulder is to be rolled according to the directions of the engineer.

UNDERDRAINS.

Underdrains, if found necessary, shall be constructed by the contractor (at prices named in bids) of good four (4) inch.....tile, laid upon a board of not less than one (1) inch in thickness and six (6) inches in width, whenever and wherever the engineer shall decide; top of tile or pipe must be at least.....inches deep, unless otherwise directed by the engineer; the joints of the tile or pipe must be covered with salt hay, or material equally as good, and trench filled with pervious earth.

When directed by the engineer a stone drain may be used in place of the tile drains. A trench one foot in width and one foot six inches in depth shall be excavated below the subgrade, said excavation to be filled with loose broken stone to a depth required by the engineer.

MATERIAL.

The material to be used in surfacing the road is to be furnished by thewithout any cost to the

The road committee, in conjunction with the engineer, subject to the approval of the Board of Chosen Freeholders, will pass upon and approve all gravel to be used in surfacing the road. The contractor is to dig, cart and place upon the road, in accordance with the specifications, the gravel selected, and use no other. Should any objectionable material be used, he is to remove the same at his own expense.

The contractor must furnish to the engineer samples of the kind of gravel to be used in the work before the opening of the bids.

The gravel is to be placed upon the road in such manner as shall be approved by the engineer, and be thoroughly rolled and solidified until it is consolidated, firm and approved by the engineer. The gravel shall be of such thickness that when it is thoroughly compacted and approved, it shall be.....inches deep in the center and slope at a regular grade to.....inches in depth at a distance of.....feet on each side of the center line.

Should any depressions appear, these are to be carefully filled with gravel, so that the finished road will conform to the approved profile.

The contractor is to be paid by the cubic yard, as per depths above named, for the compacted gravel that he puts on the road, at the price named in the accepted bid, which shall include finishing the road and shaping the shoulders as above specified.

The contractor is to place sufficient gravel on the road to allow it to shrink thirty-three per cent. in rolling and settling.

OVERHAULS.

(This only to apply when county furnishes the gravel.)

The contractor will not be required to cart any gravel a greater distance than one-half mile without extra pay for each extra half mile of carting or fraction thereof, at a price per compact cubic yard named in his accepted bid.

All gravel used for surfacing found within one-half mile of the place where it is to be used, whether on the line of the road or not, must be carted without extra pay.

SIDEWALK.

The contractor will also be required, when the engineer so directs, to grub and remove from a strip of land.....feet on outside of curb-lines all materials objectionable to the engineer, such as trees, stumps, roots and brush, and refill the holes with earth, thereby completing the opening of the entire road to a width of.....feet, which shall be.....feet on each side of the center line.

The grubbing and removing of such objectionable material that is ordered by the engineer shall be styled as "grubbing," and paid for by the acre at price named in accepted bid.

STRIPPING GRAVEL BEDS.

(This only to apply when county furnishes the gravel.)

Some of the gravel beds are covered with objectionable surface material, which must first be removed by the contractor and deposited within one-half mile where the engineer so directs, which shall be paid for by the county at a price per cubic yard named in accepted bid for removing or stripping such objectionable material from the top surface of the gravel bed. No allowance will be made for removing stumps, trees, brush or roots from gravel pit.

OPEN DITCHES.

The contractor is to grade the shoulders and open all necessary side ditches (as per stakes furnished by the engineer) so that there will be no water allowed to stand by the side of the road or upon it, for which no extra payment will be allowed.

EXTRA DEEP.

Should the road committee so order, the contractor is to build in all respects, as already specified, the gravel bed to a greater depth or thickness than that already named. The contractor is to do the same at a price named per square yard for each extra inch in depth.

NO EXTRA PRICE.

No allowance in measure of depth of pavement will be made on account of any material which may be driven in to the roadbed by rolling. The pavement, when completed, must conform to the grade and cross-section and be satisfactory to the engineer, whose decision shall be final.

No extra work will be paid for unless the price has been agreed upon between the contracting parties, including the State Commissioner of Public Roads, and endorsed upon the agreement, witnessed by the engineer.

BIDS.

Bids will be received under these specifications for the road complete as follows:

- (1) Price per cubic yard for earth excavation, without classification, as per plans and cross-sections throughout the length and width of the road.
- (2) Price per acre for grubbing and removing objectionable material from sidewalks.
- (3) Price per lineal foot for completed tile drain.
- (4) Price per cubic yard for compacted gravel as specified.
- (5) Price per cubic yard for carting gravel more than one-half mile and each additional half mile or fraction thereof.
- (6) Price per cubic yard for stripping or removing earth from top of gravel bed.
- (7) Price per square yard for each ordered inch in depth in excess of thickness named.
- (8) Price (lump) for the whole road complete, according to the specifications and plans prepared by the engineer.

No bid will be received in which all the above items are not filled out.
 Items Nos. 5 and 6 only to apply when the county furnishes the gravel.
 The person bidding the lowest on the aggregate of above propositions
 will be considered the successful bidder (all other things being equal).

ESTIMATE OF QUANTITIES.

- (1) Earth excavations.....cubic yards.
- (2) Grubbing acres.
- (3) Tile drain.....lineal feet.
- (4) Compacted gravel.....cubic yards.
- (5) Overhaulscubic yards.
- (6) Strippingcubic yards.
- Total estimated cost of the road, \$.....

These quantities are the result of calculation, but are to be considered
 as approximate. The county will not be responsible for any excess in
 above quantities, should any occur. The contractor is expected to satisfy
 himself, by a personal examination of the work contemplated, as to the
 nature, character and quantity of the labor and material required.

BOND ACCOMPANYING BIDS.

Bids shall be accompanied with the bidder's bond in the sum of one
 thousand dollars, with security satisfactory to the Board of Chosen
 Freeholders, conditioned that if the contract shall be awarded to him he
 will, when required by said Board, execute an agreement in writing to
 perform the work according to the specifications.

LIABILITIES OF CONTRACTOR.

He shall keep up sufficient guards by day and night to prevent accidents
 from travel, and will be liable for any damage which may arise from his
 neglect to do so, or from any omission on his part.

He is to commence and prosecute the work upon the road at such
 points as may be directed by the Engineer, within.....days from and
 after the signing of the contract, and shall continue work thereon until
 completion, except as herein provided.

He further agrees to complete the same on or before the.....
 day of.....A. D.....

Twenty dollars for each day that the work shall remain uncompleted,
 after the time allowed by contract, may be deducted, as liquidated
 damages, from any moneys due contractor, unless otherwise agreed upon
 by the Board of Chosen Freeholders, after presentation of certificate of
 the engineer recommending the extension of the time limit of completion.

A bonus or premium of one dollar per week will be paid the contractor for each week the road is completed before the time specified in the contract.

The contractor shall keep the finished roadway and earthwork in repair for the period of one year from the date of its completion and acceptance, during which time he shall be liable for wear and tear caused by ordinary travel, and in addition thereto, for as much longer as for any period or periods during said year it shall be out of proper condition. If, during that time, the roadway or any part of the work shall, in the judgment of the engineer and the Board of Chosen Freeholders, require repairing, and they shall duly notify the contractor to make such repairs as required, and the contractor should refuse or neglect to do so to the satisfaction of the said engineer and the Board of Chosen Freeholders, within five days from the date of service of notice, then the said engineer and the Board of Chosen Freeholders shall have the right to have the work done properly by other parties and pay the expense for the same out of the five per cent. retained.

The contractor will be required to preserve all stakes and benchmarks, made and established on the line of the work, until duly authorized by the engineer to remove the same.

The contractor shall not disturb the position of title stones (the corners of properties adjacent to the road), but where they appear he will either lift or lower them, under the personal supervision of the engineer.

The contractor must also preserve the roadway on which he is working from needless obstruction, and where necessary construct safe and commodious crossings, to be maintained in good order. He shall afford all proper and reasonable means for the accommodation of the public, and leave the roadway complete in every manner ready for immediate use.

PROVISION FOR DRAINAGE.

If it is necessary in the prosecution of the work to interrupt or obstruct the natural drainage of the surface, or the flow of artificial drains, the contractor shall provide for the same during the progress of the work in such a way that no damage shall result to either public or private interests. He shall be held liable for all damages which may result from any neglect to provide for either natural or artificial drainage, which he may have interrupted.

RIGHT TO BUILD BRIDGES, CULVERTS, ETC., AND SUSPENSION OF WORK.

The right of the county to build bridges, culverts, lay pipes or other appurtenances in said road during the progress of the work, as well as suspending the work or any part thereof during the construction of the

same, for the purposes above stated, is expressly reserved, without further compensation to the contractor for such suspension than an extension of time for completing the work as much as it may have been delayed by such suspension.

STOPPING WORK ON ACCOUNT OF WEATHER.

The engineer or supervisor may stop any portion of the work if in their judgment the weather is such as to prevent the same being done properly. No allowance of any kind will be made for such stoppage, except an extension of the time for the completion of the work as herein provided.

ABANDONMENT OF CONTRACT.

If at any time the work under contract should be abandoned, or if at any time the engineer should judge and so certify in writing that said work, or any part thereof, is unnecessarily delayed, or that the contractor is willfully violating any of the conditions or covenants of this contract, or is executing the same in bad faith, then, and in that case, the Board of Chosen Freeholders shall notify the said contractor to discontinue all work under this contract. They may employ other parties to complete the work in such manner as they may decide, and use such material as may be procured upon the line of aforesaid work, and, if necessary, to procure other material for its completion, and charge the expense of the said labor and material to the contractor, which expense shall be deducted from any moneys due him under contract. In case these expenses shall exceed the sum which would have been payable under contract, if the same had been completed by said contractor, he or his bondsmen shall pay the amount of the excess to the Board of Chosen Freeholders, on notice from the engineer.

ENGINEER.

The engineer is to be selected or appointed by the Board of Chosen Freeholders and paid by them. He is to furnish all surveys, profiles, plans, specifications and estimates of quantities of all kinds before specifications are signed, and in such a clear manner that lump bids can be made upon the work. He shall furnish all lines and grades required for the completion of the work. He is also to furnish estimates for quantities of work done before partial payments can be made, the quantity of road laid being determined by surface measurements. Should any difference arise between the contracting parties as to their meaning, his decisions on these matters are to be final and conclusive. The work is to be done according to his directions and if any material of

which he does not approve is brought upon the road, it is to be removed at the expense of the contractor. If the contractor fails or neglects to do any part of the work as specified or as directed by the engineer, then in that case all other work shall be discontinued on notice from the engineer to the contractor, or to the superintendent or foreman in charge of the work for the contractor, until such time as the work complained of has been done to the satisfaction of the engineer; and the contractor will not be entitled to or allowed any compensation or extension of time for such discontinuation or suspension of the work.

SUPERVISOR.

Nothing in these specifications relating to the duties of the engineer shall be taken or construed in any manner to conflict with the duties of the supervisor, as specifically set forth in the act entitled "An act to provide for the more permanent improvement of the public roads of this State," approved March 22d, 1895, and the acts supplementary thereto, but they shall co-operate as far as practicable.

INCOMPETENT WORKMEN.

The contractor shall employ competent men to do the work, and whenever the supervisor shall inform him, or his representative in charge, in writing, that any man on the work is unfitted for the place, or is working contrary to the provisions of the specifications or the instructions of the engineer and supervisor, he shall thereupon be discharged.

INSPECTION.

All directions and determinations necessary to give due and full effect to any of the provisions of these specifications shall be given by the engineer and supervisor.

All material and workmanship of any kind shall be subject at all times to the inspection of the engineer and supervisor. Whenever unfaithful and imperfect work is discovered, it shall be immediately repaired or replaced by the contractor, after due notification from the engineer and supervisor.

SUB-LETTING OF CONTRACT.

The contractor shall not assign or sub-let any portion of this contract without the consent of the Board of Chosen Freeholders and the State Commissioner of Public Roads.

PAYMENTS.

.....monthly payments will be made by the Board of Chosen Freeholders to the contractor for work performed, upon presentation by him of the proper certificates of the engineer and supervisor in a sum not to exceed eighty per cent. of the amount then due, together with releases from all liens, if required. Fifteen per cent. will be paid at the completion of the work. The remainder, or five per cent., will be retained by the Board of Chosen Freeholders for a period of one year, or until the road is finally approved as hereinbefore set forth.

BOND OF THE CONTRACTOR.

The contractor will be required to execute, within five days of giving of contract, a bond in such sum and with such securities as shall be approved by the Board of Chosen Freeholders, conditioned for the faithful performance of the contract, to indemnify and save harmless the said Board of Chosen Freeholders from all suits or actions of any name or description brought against them on account of any act or omission of the contractor or his agents, and for the faithful performance of the contract by the contractor. Said bond shall be in a sum of not less than fifty per cent. of the cost of the road when completed. Any change made in said plans, specifications, agreements or quantities without the consent of the bondsmen shall in no way vitiate said bond. The said contractor hereby further agrees that so much of the money due him, under and by virtue of this agreement, as shall be considered necessary by the Board of Chosen Freeholders, may be retained by them until all such suits or claims for damages aforesaid shall have been settled, and evidence to that effect furnished to the satisfaction of the said Board of Chosen Freeholders.

CONTRACTOR TO INSURE PAYMENT FOR LABOR, MATERIAL,
ETC., ON FINAL ESTIMATE.

The contractor must also furnish said engineer and supervisor with satisfactory evidence that all persons who did work, or furnished material for this contract, or who have sustained damage or injury by reason of any act, omission or carelessness on his part or his agents in the prosecution of the work, have been duly paid or secured; he shall also give notice to said engineer and supervisor within ten days after the completion of the work, and before final estimate is made, that any balance for such work or materials, or compensation for such damages due, has been fully paid or released.

The right to increase or decrease the quantity of work and to reject any or all bids is reserved.

.....
County Engineer.

.....
Road Committee.

Approved this.....day of.....A. D. 190 , by
resolution of the Board of Chosen Freeholders.

.....
Director.

Attest:

.....
Clerk.

Office of State Commissioner of Public Roads, Trenton, N. J.

I have this day carefully read and examined the foregoing specifications, and the same are hereby approved.

Any departure from these specifications which increases the cost of the road must have the written consent of the State Commissioner of Public Roads.

Given under my hand, this.....day of.....A. D. 190

.....
State Commissioner of Public Roads.

PROPOSAL.

To the Board of Chosen Freeholders of the County of.....State of New Jersey:

Gentlemen—The undersigned hereby declares that he has carefully examined the annexed specifications and the drawings therein referred to, and he will provide all necessary machinery, tools, apparatus and other means of construction, and do all the work and furnish all the material called for by said specifications, in the manner prescribed by the specifications and the requirements of the engineer and supervisor under them for the following prices:

- (1) Price per cubic yard for earth excavation, without classification, as per plans and cross-sections throughout the length and width of the road.....per cubic yard.
- (2) Price per acre for grubbing and removing objectionable material from sidewalks.....per acre.
- (3) Price per lineal foot for completed tile drain.....per lineal foot.
- (4) Price per cubic yard for compacted gravel as specified.....per cubic yard.
- (5) Price per cubic yard for carting gravel more than one-half mile and each additional half mile or fraction thereof.....per cubic yard.
- (6) Price per cubic yard for stripping or removing earth from top of gravel bed.....per cubic yard.
- (7) Price per square yard for each ordered inch in depth in excess of thickness named.....per square yard.
- (8) Price (lump) for the whole road complete, according to the specifications and plans prepared by the engineer.....

Accompanying this proposal is an approved bond for the sum of one thousand dollars (\$1,000), payable to the order of..... County Collector of.....county; which bond is to be forfeited as liquidated damages if, in case this proposal is accepted, the undersigned shall fail to execute a contract with said Board of Freeholders, under the conditions of this proposal, within the time provided for by the foregoing advertisement for proposals; otherwise, said bond is to be returned to the undersigned.

Signed.....

Address.....

.....N. J.....

CONTRACT.

This agreement, made the.....day of
in the year of our Lord one thousand nine
 hundred between
THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF
party of the first part, and.....

 party of the second part.

Witnesseth, That the said party of the second part, for and in con-
 sideration of the payments hereinafter specified and agreed to be made
 by the party of the first part, hereby covenant and agree to furnish and
 deliver all the materials and do and perform all the work and labor
 required to be furnished and delivered, done and performed in and about
 the graveling of.....
 beginning at
 and extending to.....
 in the township of.....a distance of.....

 in strict and entire conformity with the plans on file in the engineer's
 office and with the specifications hereto annexed and duly approved by
 resolution of **THE BOARD OF CHOSEN FREEHOLDERS OF THE**
COUNTY OFadopted the.....day of.....
 in the year of our Lord one thousand nine hundred.....
 and approved by the State Commissioner of Public Roads on the.....
 day of.....in the year of our Lord one thousand nine
 hundred.....which said plans and specifications
 are hereby made part of this agreement as fully and with the same effect
 as if the same had been set forth at length in the body of this agreement.

In consideration of the premises the party of the first part hereby agrees
 to pay to the party of the second part for said work, when completed in
 accordance with the said specifications, the sum of.....

 payments to be made as provided in said specifications upon presentation
 of the proper certificates of the engineer and supervisor, and upon the
 terms set forth in the annexed specifications.

This contract to be binding upon **THE BOARD OF CHOSEN FREE-**
HOLDERS OF THE COUNTY OF.....
 their successors or assigns and upon.....

 the party of the second part.....

In Witness Whereof, The Director of THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....
by authority of a resolution of said Board, hath hereunto set his hand and affixed the corporate seal of the said Board, and the said party of the second part ha.....hereunto set.....hand and seal the day and year first above written.

Signed, sealed and delivered
in the presence of

(This bond to be filled out and to accompany bid.)

KNOW ALL MEN BY THESE PRESENTS, That we.....
.....
are held and firmly bound unto THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....in the sum of One Thousand Dollars, lawful money of the United States of America, to be paid to the said THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....their successors and assigns, for which payment well and truly to be made we bind ourselves, our and each of our heirs, executors and administrators, jointly and severally, firmly by these presents.

Sealed with our seals and dated the.....
day of.....in the year of our Lord one thousand nine hundred.....

Whereas, The above bounden.....
.....
has made a proposal to THE BOARD OF CHOSEN FREEHOLDERS OF THE COUNTY OF.....in writing, bearing date theday of.....in the year of our Lord one thousand nine hundred.....
.....
and being hereto annexed, for doing all the work and furnishing all the material for the permanent improvement of the.....
road in said county of.....pursuant to an advertisement published in the.....on the.....day ofone thousand nine hundred.....

Now the Condition of this Obligation is Such, That in case the contract for which said proposal is made shall be awarded to the said.....
.....
and if.....shall, when required by the said Board, execute an agreement to perform the said work and furnish said materials according to the specifications annexed to said proposal, then this obligation shall be void, or otherwise shall remain in full force and virtue.

Signed, sealed and delivered
in the presence of



Passaic Valley road, Morris Co., before improvement.



Passaic Valley road, Morris Co., after improvement.

ROAD BUILDING IN UNION COUNTY.

JACOB L. BAUER, COUNTY ENGINEER.

The roads in Union county were mostly constructed during the years from 1889 to 1893, inclusive, before the era of State aid. During the past two years there have been built several miles of roads, which were constructed under the State Aid laws. With the latter exceptions, however, the roads were built and paid for by the county solely. They are some forty miles in extent, and cover the county fairly well in providing communication between the cities and the main villages.

The roads that were constructed from 1889 to 1893 were all of telford-macadam, running in depth from 8 to 12 inches, and in width from 10 to 16 feet.

The value of these highways to the county cannot be overestimated. The soil of this section of the State is largely of a clayey nature, especially in that section of the county adjoining tide-water, and the old country roads, were probably among the worst in the State, previous to their improvement by the county. On the highways about Westfield and on the road running between Elizabeth and Rahway, St. George avenue, in the olden time, it was a common sight to see during the wet seasons, three and four heavy wagons stalled within sight of one another. In the fall they were most likely to become stalled about nightfall, as the mud stiffened. The wagons being abandoned for the night, would freeze into the mud before the morning, and part of the next day was lost in digging them out.

To anyone who was at all familiar with the conditions that prevailed at that time the contrast between then and now is very sharp. The general public is disposed to take such improvements with equanimity, and it is very difficult, as a general thing, for a person to realize after a few years just what a difference would be necessary in his business arrangements if a return were to be made to the system of roads that formerly prevailed. I am of the belief, however, that if it were a possible thing, and any government should venture to return to the old conditions, the tenure of office of that government would be extremely short-lived.

The owners of the present-day narrow-rubber-tired vehicles and the owners of automobiles, if they happen to be gifted with a strong imagination, should compare then and now, and they would be less apt to complain if a few loose stone are found on the surface of a macadamized road.

This year Cranford township took up the matter of adding to its good roads through the aid of the State. Cranford is the first of the townships of the county to avail itself of State aid. One of the county roads, built twelve years ago, runs through the township from east to west. The present improvement that has been undertaken by the township comprises some two miles of roads, and runs through the township from north to south.

In this connection I would state that whereas the counties, when improving roads, get one-third of the cost of the improvement from the State, townships get but 23 1-3 per cent. There would seem to be no good reason why the townships should not benefit as much as the counties when they undertake road improvements. In Union county such a change would result in many more roads being built, very likely, as the county is not disposed to spend any more money at the present time on additional roads, and the townships and other municipalities must build the new roads for some years to come.

For the maintenance of its roads Union county spends about \$17,000 every year. It has been found that a road cannot be properly repaired oftener than once in three and one-half or four years with the available appropriation. Some of the more traveled roads show from two to three inches wear in that period, and the resurfacing is sometimes done none too soon to save the life of the road.

Nearly all of the roads in the county were constructed with clay-binder. From my observation I should lay down the following rule for the use of the clay-binder: Where the road is being built in residential sections, in which there is assurance that the road is to be sprinkled in the summer time, no clay-binder should be used, as the use of clay-binder would result in muddy surfaces during the time of the sprinkling. In country districts, however, where there is no possibility of the road being sprinkled during the hot weather, the use of clay-binder should prevail, as the road will be found to hold together much better during the hot and dry seasons which are so destructive of macadamized roads.

THE NECESSITY FOR PROPER GRADES.

The United States Government experts say on the subject of unsurveyed roads:

"Many roads of this country were originally laid out without any attention to general topography, regardless of grades or direction. Most of them remain to-day where they were originally located, and where untold labor, expense and energy have been wasted in trying to haul over them. It is a great error to continue to follow these primitive paths with public highways. The proper thing to do is to call in a good engineer and have the location so changed as to throw the roads around the ends or along the sides of the steep hills and ridges instead of continuing to go over them."

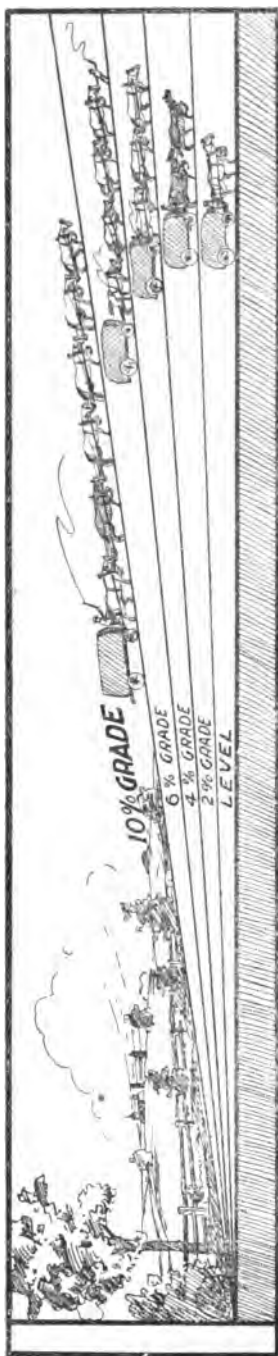
The question is, Are we following the "primitive paths?" If we have not changed them, we are certainly doing so.

To illustrate the enormous extra cost of hauling over such unskillfully placed roads, and to get an idea of the obstruction that these old highways place in the way of progress and prosperity, one may observe the accompanying cut, showing the consequences of the hills of these unsurveyed roads.

THE TERRIBLE HILLS.

(Drawn from the United States tables.)

It will be seen that what one horse can pull on a level requires two horses to draw when a hill rising two feet to 100 is reached; requires three horses to draw when a hill rising four feet to the 100 is reached; four horses when a rise of six feet to the 100 is encountered; and requires six horses to draw when a hill rising ten feet to 100 stands in the road. The enormous excess cost of hauling on these roads, over roads on a level, is, therefore, apparent. The legal rate in many sections is 3 to 4 per cent. maximum, beyond which a grade is not allowed to go. Grades of even this steepness are the exception, roads being kept to 1 or 1½ per cent. as far as possible. By the most ordinary surveying

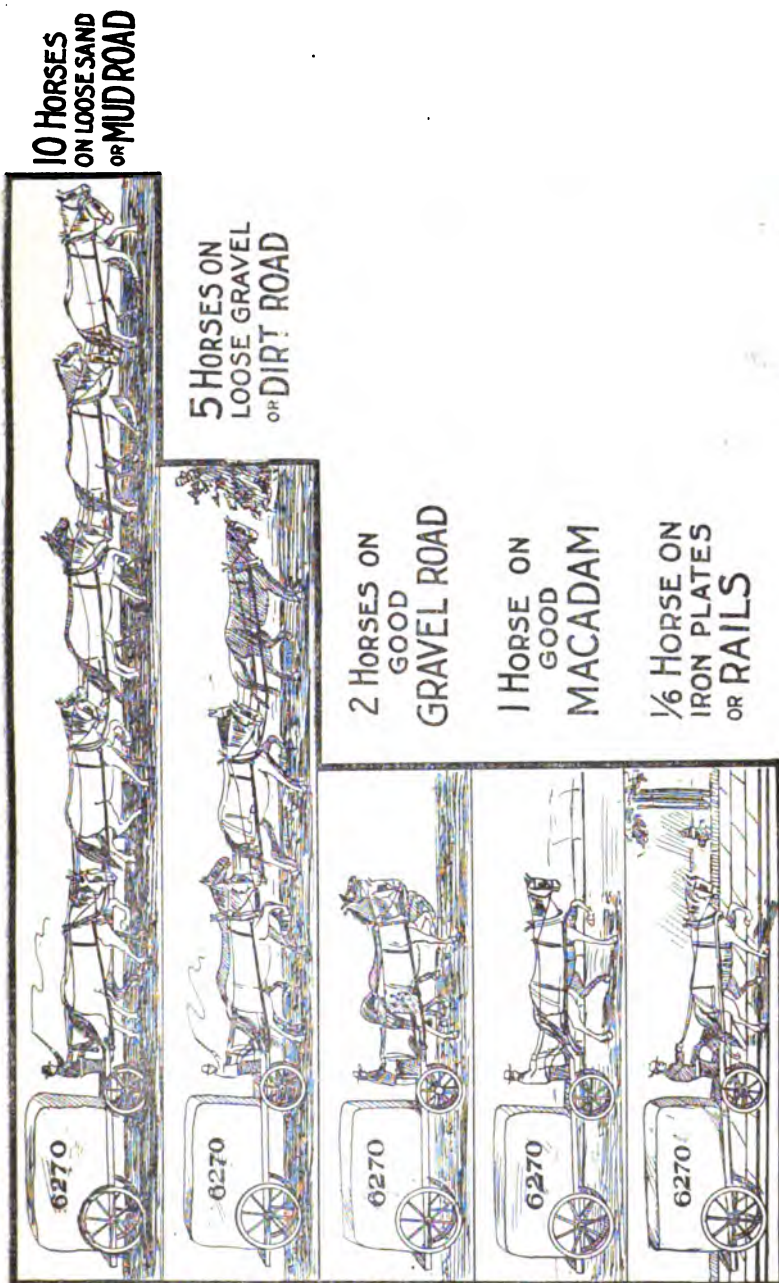


the roads of any section outside of mountain districts can be brought to reasonable grades. The Government and all other authorities urge sections using these "primitive paths" to correct them by proper surveying.

General Roy Stone, of the Government service, said several years ago of what he called the "hill tax:" "The people have paid this tax for 100 years and yet they wonder why they are poor." It is apparent that it is the duty of the thinking people of this section to bring about a revolution in the systems of public highways of the section hereabouts without which we cannot expect great, if indeed but little, progress. This is of as great importance as ever the matter of railroad development was.

We have seen the terrible excessive cost of hauling imposed in this section by the hills which engineers have never been employed to go around. Now let us look for a moment at the matter of surfaces. The accompanying illustration will present graphically the relative values of different road surfaces.

It will be seen that a horse can pull 6,270 pounds on a level, macadam road, and that it takes five horses to pull the same load on the surface of an ordinary dirt road, and ten horses to pull the load in loose sand or mud. In other words, it takes five and ten times the power and investment in stock, and therefore costs from five to ten times in this section to do the same amount of hauling that is done on the macadam surfaces provided in many portions of the United States—in New Jersey, for instance. This is only con-



sidering the matter of surfaces. Now put together the excess cost of hauling on the public highways on account of the hills and the surfaces, and the enormity of this cost and the drain upon the section is apparent. Apply the same principles, the same excess of cost, to railroad transportation and the enormity of the thing, from an industrial point of view, is seen. *The combination of a bad surface up a steep hill such as we have in the hill regions furnishes the acme of industrial ferocity*, being enough to totally prevent agricultural profits, which it does accomplish completely, in some districts.

Business is competitive—agricultural and country business as well as any other. The products of these sections are sold at the world's prices, and it is plain that these sections cannot compete in raising crops—cotton, corn, hay, grain, meat, in lumbering, milling, dairying, &c., or in the offering of attractions to settlers, with sections provided with intelligent, modern road systems.

APPENDIX B.

Following is the text of the State Aid Road Law, with its amendments:

CHAPTER CCXXIII.

An Act to provide for the permanent improvement of public roads of this State.

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That whenever the board of chosen freeholders of any county in this State shall, by resolution, have declared their intention to cause any particular road or section thereof, within such county, to be improved under the provisions of this act, such board shall cause all necessary surveys to be made and specifications to be prepared; the specifications shall require the construction of a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good materials, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; shall be so prepared as to call for bids from which an approximate estimate of the cost can be ascertained, and shall state the amount of security that will be required of the bidder; after said specifications shall have been prepared they shall be submitted to the board of chosen freeholders for their approval or rejection; and if such board shall approve them, they shall then be submitted to the state commissioner of public roads for his approval or rejection; it shall be the duty of the commissioner of public roads, before approving the specification of any road so submitted to him, to ascertain by

Board of freeholders may cause road to be improved

What specifications required.

How prepared.

Freeholders to reject or approve.

Commissioner to examine road and approve specifications.

Cost of all roads not to exceed 88¼ per cent.

May withhold his approval.

Distribute among the counties.

When approved, freeholders must advertise for bids.

personal examination or otherwise, the natural character of the soil upon which such road is proposed to be constructed, and all other facts that he may deem important, and if, after examination of the specifications and facts so ascertained, he shall be of the opinion that the specifications provide for the construction of a road that will, with reasonable repairs thereto, be firm, smooth and convenient for travel at all seasons of the year, and if he shall also be of the opinion that one-third of the cost of constructing the road or section of road to which such specifications relate, together with one-third of the cost of constructing all other roads and sections of roads in this State under specifications previously approved by him, will not in any one year exceed the sum of one hundred thousand dollars, then he shall approve the specifications, but otherwise he shall reject them; *provided, however*, that he shall, in his discretion, have the power to withhold his approval of any specifications, to the end that the estimated aggregate amount of contracts made in any one year shall not exceed the sum of three hundred thousand dollars, and also to the end that the amounts paid out of the state treasury under the provisions of this act shall in each year be distributed amongst the several counties of the state in such manner as to the said state commissioner of public roads shall seem fair and equitable, and any specifications, the approval of which is withheld as aforesaid, may, if otherwise satisfactory to the said state commissioner of public roads, be approved by him in any year subsequent to the one in which the same may be presented for approval as aforesaid; if the board of chosen freeholders and the state commissioner of public roads shall both approve such specifications, it shall then be the duty of the director of the board of chosen freeholders to advertise in at least two daily newspapers, printed and circulating in the county, for the period of two weeks, or in at least two weekly newspapers, printed and circulating therein, for at least four weeks, for bids to do the work ac-

cording to the specifications prepared; such advertisements shall state where bidders may find the specifications, and shall name a time and place where the board of chosen freeholders, or a committee of five members thereof, of whom the director shall be one, will meet to receive bids; every such bid shall be accompanied with the bidder's bond in the sum of one thousand dollars, with security satisfactory to the board, conditioned that if the contract shall be awarded to him he will, when required by the board, execute an agreement in writing to perform the work according to the specifications; no bids shall be received by the board or any member thereof, or by said committee or any member thereof, except at a meeting of said board or committee, of which notice shall be given as aforesaid, and all bids then received shall be immediately publicly read; if the bids shall be received by a committee of the board they shall be reported to the board at the next meeting thereof, with the recommendations of the committee; the board may reject all bids if, in their opinion, good cause exists therefor, but otherwise they shall award the contract to the lowest bidder who shall give satisfactory evidence of his ability to perform the contract; *provided, however*, that the estimated amount of contracts awarded in any one year by any board of chosen freeholders, together with the estimated cost of repairs of roads already constructed, shall not exceed one-fourth of one per centum of the ratables of the county as reported to the state comptroller for the last preceding year; *and provided further*, that in every contract made as aforesaid it shall be specified that at least five per centum of the contract price shall not be paid to the contractor within the period of one year after the work specified to be done by such contract shall have been fully performed and accepted; the bidder to whom the contract may be awarded shall, in addition to executing the agreement to perform the work according to the specifications, also execute to the board of chosen freeholders a bond conditioned for the faithful performance of the contract, in the sum

Committee to
receive bids.

Bidders must
give bond.

Bids, how re-
ceived.

Limit of county
expenditures.

Five per
centum to be
retained by
county.

Contractors
must give
bond.

Copy of contract and specifications filed with state commissioner.

specified in the advertisement for bids, and with such sureties as the board may approve; the contract shall, on behalf of the board of chosen freeholders, be executed by the director thereof, and, when executed by the bidder and said director, a copy of the contract and specifications, with the estimated cost of the work, shall be forthwith filed with the state commissioner of public roads.

Commissioner must appoint supervisor.

2. *And be it enacted*, That after a copy of the contracts and specifications shall have been filed with the state commissioner of public roads as aforesaid, the said state commissioner of public roads shall, as soon as practicable, appoint a supervisor of the construction of the work under such contract, who shall receive for his services under this act three dollars per day, to be paid out of the county treasury; if the work for which such contract shall be made shall have been petitioned for, pursuant to the provisions of the eighth section of this act, then, if the petitioners therefor, or any of them, shall in writing nominate to the said state commissioner of public roads one or more persons for the position of such supervisor, it shall be the duty of said state commissioner of public roads, if only one nomination be made, to appoint as such supervisor the person so nominated, and, if more than one nomination be made, to appoint as such supervisor one of the persons so nominated, and if no such nomination be made, the said state commissioner of public roads shall then appoint as such supervisor any person whom he may consider competent for such position; the said state commissioner may, however, at any time summarily discharge any supervisor who, in the judgment of the state commissioner, is incompetent or who neglects his duty, and, in such case, shall appoint a new supervisor to take the place of the one so discharged; the supervisor shall supervise all work done under the contract, shall give his whole time thereto, shall require the provisions of the contract to be strictly adhered to by the contractor, and in any case where the contract provides for partial payments during the progress of the work, he shall

Property-owners nominate supervisor.

Commissioner may remove supervisor.

Supervisor must give his full time to the work.

also, as each payment becomes due, and before payment shall be made, present to the board his certificate, and also the certificate of the surveyor or engineer, if any there be, stating as near as may be the total amount of work done, and that such work has been done in all respects as required by the contract; and the board shall thereupon direct payment to be made by the county collector; *provided*, that no partial payment made during the progress of the work shall exceed eighty per centum of the estimated value of the work done; the board shall have power to borrow on temporary loans on the credit of the county such sums of money for the purpose of carrying on such work as may from time to time become necessary; and when the work shall have been fully completed, and the terms and conditions of the contract shall have been fully complied with, and such facts shall have been certified to the board to their satisfaction by the supervisor and the surveyor or engineer, if any there be, payment in full shall be made, less the amount required to be withheld for the period of at least one year, as in the next preceding section specified.

Supervisor
must certify
payments.

Freeholders
may borrow
money tempo-
rarily.

3. *And be it enacted*, That when the work under any contract shall have been fully completed, it shall be the duty of the supervisor to prepare a detailed and itemized statement in duplicate of the cost of the improvement, one copy whereof shall be filed with the board of chosen freeholders and one with the state commissioner of public roads.

Supervisor to
prepare final
certificate.

4. *And be it enacted*, That one-third of the cost of all roads constructed in this state under this act shall be paid for out of the state treasury; *provided*, that the amount so paid shall not in any one year exceed the sum of one hundred thousand dollars; if one-third of such cost shall appear by the statements filed in any one year with the state commissioner of public roads to exceed the said sum of one hundred thousand dollars, then, and in such event, the said sum of one hundred thousand dollars shall be apportioned by the governor and state commissioner of public roads amongst the counties of

State to pay
one-third cost.

Total state ap-
propriation.

the state in proportion to the cost of roads constructed therein for such year, as shown by the statements of costs filed in the office of the state commissioner of public roads; the governor and said state commissioner of public roads shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated.

Allotment to be made before December 31st.
Comptroller to draw warrants.
Board of freeholders to certify cost to assessors.
Deficiency, how met.

5. *And be it enacted*, That on or before September first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, two-thirds of the estimated cost of all work for which contracts shall have been awarded under this act during such year; and the county board of assessors shall include the sum so certified in the county taxes assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the cost exceeding the estimate, or in consequence of the receipt of less than one-third of the cost from the state treasury, the board of chosen freeholders shall have authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county; and if there be a surplus, in consequence of the cost being less than the estimate, such surplus shall be retained and used in the construction of other roads under this act, or in repairs to roads constructed under this act.

Two-thirds less one-tenth.

6. *And be it enacted*, That instead of certifying to the county board of assessors two-thirds of the estimated cost of all work for which contracts shall have been awarded under this act in any one year, as required by the fifth section of this act, or two-thirds of said

estimated cost, less one-tenth of said estimated cost, as required by the eighth section of this act, the said board of chosen freeholders may, if a resolution to such effect shall be adopted by a vote of at least two-thirds of all its members, borrow such sum or sums of money as may be necessary for the payment of such proportion of said estimated cost by the sale of the bonds of such county, issued in the name of the board of chosen freeholders thereof, and in such sums as the said board may deem proper; said bonds shall bear interest at a rate not exceeding five per centum per annum, shall be sold at not less than their par value, shall not exceed in the aggregate the proportion of the estimated cost of such roads as hereinabove mentioned, shall be so divided that one-tenth of the amount of the proportion of said estimated cost shall fall due in one year from their date, and one-tenth of the proportion of said estimated cost in each successive year thereafter for the period of ten years after their date, and shall be either coupon or registered bonds, as the board of chosen freeholders may determine; the principal and interest thereof may be made payable at the office of the county collector of such county; said bonds shall be signed by the director of said board and the county collector, and shall be sealed with the seal of the county, and the county collector shall keep a record thereof; it shall be the duty of the board of chosen freeholders each year to place in the tax levy for such county in each year, so long as said bonds shall run, a sufficient sum to pay the interest accruing thereon for said year and the principal of the bonds that shall mature in said year.

Bonds, how sold.

When to mature.

Record to be kept.

7. *And be it enacted*, That any road constructed under the provisions of this act, except within the limits of any city, shall forever thereafter be a county road, and the duty of keeping the same in repair, except within the limits of any city, shall devolve upon the board of chosen freeholders and the county supervisor hereinafter mentioned, and all other powers and duties respecting such roads, except within the limits of any city, shall be imposed upon and vested in the said board

County road, township rights acquired.

County supervisor, when appointed.	of chosen freeholders, to the exclusion of all township, borough or other municipal officers excepting city officers; after the first road shall have been constructed under this act in any county, it shall be the duty of the board of chosen freeholders thereof to appoint a county supervisor of roads, who shall hold his office for three years and until his successor is appointed, shall give bond to the board of chosen freeholders in the sum of one thousand dollars conditioned for the faithful performance of the duties of his office, with such sureties as the board may approve, and shall receive such salary or allowance as the board may fix; the board of chosen freeholders shall provide all moneys necessary to keep in a proper state of repair the roads constructed under this act, except within the limits of any city, and may, if there be no moneys on hand that can be lawfully used for such repairs, borrow therefor on temporary loans until the next annual taxes shall have been assessed, collected and paid over to the county; it shall be the duty of the supervisor to report to the board of chosen freeholders, or to the road committee thereof, all repairs he may think necessary or proper to be made to such county roads, and under the direction and control of the said board of freeholders, or its road committee, to expend moneys raised for such repairs in such manner and upon such portions of the roads as will tend to keep them in the best possible state of repair; no part of said moneys shall be paid into the hands of the supervisor, but all expenses of repairs shall be paid by the county collector on the orders of the board of chosen freeholders, granted only on the presentation of bills verified by affidavit, as now required by law in the case of other claims against the county; if the board of chosen freeholders shall neglect or refuse to make appropriations sufficient to keep any such road as aforesaid in good repair, any citizen of the county may apply to the supreme court for a writ of mandamus to compel said board to make an appropriation as aforesaid; and when any such application is made, the court, upon a rule to show cause or otherwise, in such manner as the court shall prescribe, shall ascertain and determine
Compensation to be fixed. Duties of.	
County to borrow by temporary loans.	
Money, how expended.	
County collector to make all payments.	
Neglect to repair.	
Freeholders to be mandated.	

whether such road as aforesaid is in a proper state of repair and may also, in its discretion, allow to the attorney of the applicant a reasonable counsel fee to be paid by the county; in case the board of chosen freeholders shall not have on hand sufficient moneys out of which to make the appropriation commanded to be made by any writ of mandamus granted as aforesaid, they shall borrow such sum or sums as may be necessary therefor on temporary loans on the credit of the county, and shall require the amount so borrowed to be raised by taxation with the next assessment of county taxes; it shall be the duty of the authorities of any city within which any portion of road may be constructed under the provisions of this act to keep the portion thereof within such city in repair forever after such construction, and such city shall have the same power, authority and jurisdiction over such portion of such road, and shall have imposed upon it the same duties as were imposed upon and vested in it with respect to such portion of such road before its improvement under the provisions of this act.

Portion of road within city limits to be kept in repair by the city.

8. *And be it enacted*, That whenever there shall be presented to the board of chosen freeholders of any county a petition signed by the owners of at least two-thirds, either in lineal feet or area, of the lands and real estate fronting or bordering on any public road or section of road in such county, taking in said estimate of area all the lands of every such owner which are assessed for taxes in said county and which lie together in any farm, tract or lot of which a part has a frontage on said road or section of road, praying the board to cause such road or section to be improved under this act, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road or section shall be assessed thereon in proportion to the benefits conferred to an amount not exceeding ten per centum of the entire cost of the improvement, it shall be the duty of the board to cause such improvement to be made; *provided*, that the road or section desired to be so improved shall be

Petition, how signed.

Lineal feet or area.

Length of road.

If less than
one mile.

Estimated cost
not to exceed
one-fourth of
one per centum
of ratables.

Board of free-
holders to se-
lect road under
certain circum-
stances.

Must cause
surveys to be
made and
specifications
prepared.

Stone or other
good material
to be used.

When speci-
fications are not
approved or
bids rejected.

Other speci-
fications to be
made.

No re-adver-
tisement neces-
sary.

at least one mile in length, or, if it be less than one mile in length, shall be an extension of or connection with some other permanently improved or paved road or street; *and provided further*, that the estimated cost of all improvements made under this act, together with the estimated cost of repairs of roads already constructed in any county in any one year shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year; *and provided further*, that where more roads are applied for than can be constructed under this act in any one year, the said boards of chosen freholders shall have the power and authority to select from the roads petitioned for the ones first to be constructed, having regard to the most important roads and the distribution of the benefits of this act to all parts of their counties; it shall not be necessary for the board in any such case to declare by resolution their intention to cause such improvement to be made, but they shall forthwith cause all necessary surveys of such road or section to be made, and specifications to be prepared for a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good material, in such manner that the same, of whatever materials constructed, will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel; the proceedings shall thereafter be the same as is hereinbefore required in cases where such intention has been declared; if the specifications shall not be approved by the board or by the state commissioner of public roads, or if all the bids for the work shall be rejected, it shall be the duty of the board to cause other specifications to be prepared, or re-advertisements for bids to be made, as often as may be necessary and until a contract shall be awarded, to the end that the improvement prayed for may be completed with reasonable speed; *provided, however*, that no re-advertisement need be made where the lowest bid submitted shows that the improvement prayed for cannot be made within the limit of expenditure in this section above mentioned;

in every case where a contract shall be awarded after the presentation of such petition as aforesaid, the board of chosen freeholders, instead of certifying to the county board of assessors two-thirds of the estimated cost of the work, as prescribed by the fifth section of this act, shall, unless they determine to issue bonds in the manner prescribed by the sixth section of this act, which they are hereby authorized to do, certify two-thirds of said estimated cost, less one-tenth of said estimated cost, which sum the county board of assessors shall include in their assessments of county taxes.

After contract awarded, board to certify two-thirds estimated cost, less one-tenth to assessors.

9. *And be it enacted*, That when the improvement prayed for as aforesaid shall have been completed and the statement of the cost thereof filed with the board of chosen freeholders, as prescribed by the third section of this act, said board shall apply to the circuit court of the county for the appointment of commissioners' to estimate and assess the peculiar benefits conferred by such improvement upon the lands and real estate fronting or bordering on the road or section thereof improved, of the time and place, of which application notice shall be given by ten days' publication in two daily newspapers printed and circulating in the county, or by two weeks' publication in two weekly newspapers printed and circulating therein, at which time and place, or at such other time and place as the court shall designate, said court shall, without unnecessary delay, appoint three commissioners, who shall be disinterested freeholders and residents of the county in which the application is made, to estimate and assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place and also fill any vacancy that may occur in the office of any commissioner from any cause; said commissioners shall each receive three dollars per day, to be paid by the county collector.

Commissioners to estimate benefits, how. appointed.

To give notice of appointment of.

Court to appoint and remove commissioners.

Compensation of.

10. *And be it enacted*. That said commissioners, before entering upon the duties required of them by this act, shall take and prescribe before some person duly authorized to administer the same an oath or affirmation

Oath of commissioners.

that they will make all assessments and estimates required of them fairly, legally and equitably, according to the best of their skill and understanding, which oath or affirmation shall be attached to the report that they are hereinafter required to make.

Commissioners
to give public
hearing of time
of meeting.

11. *And be it enacted*, That the said commissioners, having thus qualified, shall give such notice as the court may direct of the time and place when and where they will hear any persons in interest who may present themselves to be heard, and at such time and place and at such other times and places to which they may adjourn for that purpose the said commissioners shall attend, and shall give a public hearing to those persons in interest who may desire to be heard; the said commissioners shall have power to examine witnesses under oath or affirmation, to be administered by any one of them, and to enter upon and view the lands and real estate fronting or bordering on the road or section thereof improved, and to adjourn from time to time in their discretion, or as directed by said court; they shall use diligent efforts to ascertain the names of the owners of the lands fronting or bordering on the road or section thereof improved, and shall state the same in the report hereinafter mentioned; but the failure to ascertain the name of any owner, or to state the same correctly, or the omission of any such name from the report, shall not invalidate said assessment nor be a bar to the collection of the same.

Commissioners
to report in
writing.

12. *And be it enacted*, That after having given opportunity as aforesaid for a public hearing of the persons in interest, and having viewed the lands fronting or bordering on the road or section thereof improved as aforesaid, the said commissioners shall make a report in writing of their estimates and assessments to the said court, accompanied by a map prepared by the engineer in charge of the construction of the road, showing the several tracts or parcels of land and real estate fronting or bordering on said road or section thereof; the said report shall state the cost of the whole work, which shall be furnished to the commissioners by the board of

Map made by
engineer in
charge of the
road.

chosen freeholders from the report of the supervisor of construction filed with said board under the requirement of the third section of this act, and shall give the names, so far as ascertained, of the owners of the tracts or parcels of land and real estate fronting or bordering on said road or section thereof, the city, township, borough or other municipality in which each tract or parcel of lands is situate, and the amount of the assessments upon the owner or owners of each of said tracts or parcels of lands and real estate for the said benefits; which several assessments shall be in proportion, as near as may be, to the peculiar benefits deemed to have been conferred by said improvement upon the respective tracts of lands and real estate aforesaid; if any tract of land shall be located in more than one city, township, borough or other municipality, it shall be stated in said report as being in the city, township, borough or other municipality, in which there is the greatest frontage by lineal feet on the road or section thereof improved; in no case shall any tract or parcel of land and real estate, or any owner thereof, be assessed beyond the amount of benefit actually derived from said improvement, nor shall the aggregate amount of assessments imposed upon the tracts or parcels of land fronting or bordering on such road or section thereof exceed ten per centum of the total cost of the improvement.

Names of property-owners required.

Location of tracts of land.

13. *And be it enacted*, That upon the coming in of any such report signed by the said commissioners, or any two of them, said court shall cause such notice to be given as it shall deem proper, of the time and place of hearing any objections that may be made to such assessment, and after hearing any matter that may be alleged against the same the said court, either by rule or order, shall confirm the said report, or shall refer the same to the same commissioners for revision and correction, or to new commissioners to be appointed by the said court forthwith to reconsider the subject-matter thereof, and the said commissioners to whom such report shall be so referred by the court shall return the same

Court to give notice of hearing.

Court may order new report.

When report is confirmed shall be final and conclusive.

File with county clerk. Copies to county collector and townships, &c.

Township to collect in six months.

No certiorari allowed.

corrected and revised, or a new report to be made by them in the premises, to the said court, without unnecessary delay, and the same, being so returned, shall be confirmed, or again referred by the said court in the manner aforesaid, as right and justice shall require, and so, from time to time, until a report shall be made or returned in the premises which said court shall confirm; such report, when so confirmed, shall be final and conclusive, as well upon the said boards of chosen freeholders and the cities, townships, boroughs or other municipalities in which said lands may be situate, as upon the owners of any lands and real estate affected thereby, and the court shall require the same to be forthwith filed with the county clerk, and certified copies thereof and of the accompanying map, and of the rule or order confirming the report, to be promptly delivered to the county collector, one for said county collector and for each city, township, borough or other municipality in which the assessed lands may lie; the county collector shall retain one of the said copies for his own use, and shall forthwith give one to the collector or receiver of taxes in each of the cities, townships, boroughs and other municipalities in which the assessed lands may lie; each city, township, borough or other municipality whose collector or receiver of taxes shall receive such certified copy shall, by its proper disbursing officer, within six months after the date of the said order of confirmation, pay the amount of assessments appearing by said report to have been assessed upon the lands situate in such city, township, borough or other municipality, who shall receive for his services three per centum of the money so collected to be paid by the county.

14. *And be it enacted*, That no certiorari shall be allowed by any court to review any of the proceedings in relation to such improvement, nor in any way to affect any assessment made by such commissioners, after the lapse of thirty days from the making of the order of the court confirming such assessment; the court shall designate what notice, if any, shall be given by the

publication or otherwise of the confirmation of the report of said commissioners.

15. *And be it enacted*, That the assessments made by said commissioners shall be and remain a lien upon the lands assessed from the date of the confirmation of the report of assessments in the same manner and to the same extent that taxes are liens upon lots or tracts of land situate in the city, township, borough or other municipality in which the assessed lands may be.

Assessments to remain a lien on the property.

16. *And be it enacted*, That the receiver or collector of said city, township, borough or other municipality shall, as soon as the said report is delivered to him, give to the owners of lots and tracts of lands appearing by said report to be assessed, such notice of the assessments and of the time within which the same are required to be paid, as the court in its order of confirmation, hereinabove mentioned, shall prescribe; all such assessments shall become due and payable to such receiver or collector within six months from the date of the order of confirmation hereinabove mentioned.

Collector to notify owners of lands.

17. *And be it enacted*, That if any assessment upon any lot or tract of land made under the provisions of this act shall not be paid within the time appointed in said notice, the township committee, common council or other governing body of the city, township, borough or other municipality within which such lot or tract of land shall be situate, or a majority of them, may, as they shall deem proper, either bring an action on contract in any court of competent jurisdiction, in the corporate name of such city, township, borough, or other municipality, against the owner or owners of such lot or tract of land for so much money laid out and expended by them for the use of such owner or owners and declare generally, and give the special matter in evidence, and either party from any judgment rendered therein may have the same remedy by appeal or otherwise as if said parties were private individuals, or they may proceed to collect the said assessment by sale of the lot or tract of land whereon such assessment has been imposed, or may be a lien, in the same manner and to the same

Township, &c., to bring suits for collection of assessments.

Either party may appeal.

Assessments to be a lien upon the lands and sold as lands are now sold for taxes.

extent as lands are now sold for unpaid taxes in such city, township, borough or other municipality, and the purchaser or purchasers at any such sale or sales, and his legal representatives shall hold and enjoy such lot or tract of land, with the rents, issues and profits thereof, in the same manner and by the same title and tenure as purchasers at the sales of lots or tracts of land for unpaid taxes can now hold and enjoy the same in such city, township, borough or other municipality.

Property-own-
ers may im-
prove at their
own expense.

18. *And be it enacted*, That if any property owners or owner along any road in any county of this state which has not been improved, or is not undergoing improvement, under the previous sections of this act, shall desire any section of any road in such county to be improved, and are or is willing to contribute the whole expense of such improvement, the supervisor of roads of such county shall, upon the written request of such owners or owner, make a plan of such section of road so to be improved, in which shall be given the levels and distances, and also specifications, which shall state the materials that may be used, and the manner of using them; and a copy of such plan, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, and proceed to build such section of road according to such plan and specifications, and such owners or owner shall have control of the expenditure of the moneys used to make such improvement, subject to the approval and supervision of the supervisor of such county; and upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts, showing full payment for materials furnished and work done under the plan and specifications, such section of road so improved shall thereafter be a county road; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for

Bids and speci-
fications re-
ceived.

Owners to dis-
burse the
money.

Shall be a
county road.

Fees allowed.

making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and in case such supervisor is not a civil engineer and an actual survey is necessary, then such owners or owner, at their or his expense, shall procure a survey, which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned.

19. *And be it enacted*, That the act entitled, "An act to provide for the more permanent improvement of the public roads of this state," approved the fourteenth day of April, one thousand eight hundred and ninety-one, and all acts supplementary thereto and amendatory thereof, be and the same are hereby repealed; *provided*, General repealer. *however*, that this section shall not cause any proceedings for the improvement of any public road or section thereof under the provisions of the act hereby repealed to abate, but such proceedings may be continued under the provisions of this act in the same manner as if they had been commenced hereunder. Proviso.

20. *And be it enacted*, That this act shall take effect immediately.

Approved March 22, 1895.

CHAPTER 6.

ACT TO INCREASE APPROPRIATIONS.

▲ Further Supplement to "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

1. The sum of two hundred and fifty thousand dollars be and the same is hereby appropriated annually, or so much thereof as may be included in the annual

Appropriation for roads.

appropriation law, to be paid out of any moneys in the state treasury not otherwise appropriated, for the extension of the benefits and making effective the provisions of the act to which this act is a supplement.

Repealer.

2. All acts or parts of acts inconsistent herewith be and the same are hereby repealed, and this act shall take effect immediately.

Approved March 5, 1902.

CHAPTER 44.

STATE AID TO TOWNSHIPS.

Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this State," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

When property may be assessed not to exceed 10 per cent. for road benefits.

1. Whenever there shall be presented to the township committee, borough council, board of trustees or commissioners, or other governing body of any township, town, borough, village, or municipality governed by a board of commissioners, a petition signed by the owners of at least two-thirds in lineal feet of the lands fronting on any public road or section of road in such township, town, borough, village or municipality, praying such governing body to cause such roads or section to be improved under the act to which this is a supplement, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting on said roads or section shall be assessed thereon, in proportion to the benefits conferred, to an amount not exceeding ten per centum of the entire cost of the improvement, it shall be the duty of such governing body to consider and determine whether the road or section mentioned in such petition is of sufficient general importance to

warrant the expenditure necessary for the improvement thereof, and to grant the prayer of such petition or refuse the same if of opinion that the improvement is not of sufficient public importance, or that the expense thereof will be an unnecessary public burden; and in case the prayer of such petition is granted, then such road shall be improved in the same manner and subject to the same regulations, as far as practicable, as in case where a petition is presented to the board of freeholders of any county under the eighth section of the act to which this is a supplement.

2. The said governing body shall cause all necessary surveys to be made, and specifications to be prepared for a macadamized road, or a telford or other stone road, or a road constructed of gravel, oyster shells or other good material, in such manner that the same will, with reasonable repairs thereto, at all seasons of the year, be firm, smooth and convenient for travel, and shall thereafter proceed in the same manner as the board of freeholders is required to proceed by the act to which this is a supplement; and the state commissioner of public roads shall have the same power and authority in respect to the roads authorized by this supplement as by said act are conferred upon him in respect to roads improved under such act.

Construction of
road: super-
vision.

3. The state commissioner of public roads shall appoint as supervisor of the work, such person as shall be nominated by such governing body; such supervisor shall perform the same duties and shall be subject to the same provisions as the supervisor appointed under the act to which this is a supplement, and shall be paid out of the treasury of the township, or other municipality, and shall file one copy of the statement required by the third section of the aforesaid act with the township committee, or other municipal authority, and the other with the state commissioner of public roads.

Supervisor of
construction.

4. The aggregate amount of the peculiar benefits conferred on the lands fronting on any road improved under authority of this supplement, not exceeding ten

Proportion of
charges how
assumed.

per centum of the entire cost of the improvement, shall be borne by the owners of the land so benefited, one-third of the cost of the improvement (less so much thereof not exceeding one-tenth as shall be assessed upon the property benefited) shall be paid for out of the state treasury; the remaining two-thirds of such cost shall be borne by the said township, or other municipality within which said road is located.

**Assessment of
benefits.**

5. The amount of peculiar benefits conferred by such improvement on lands fronting on such road shall be assessed on the application of the township committee, or other governing body, in the manner prescribed by the act to which this is a supplement, and all proceedings under this supplement shall conform as far as practicable to the proceedings authorized and directed by said act, and the said governing body shall, so far as concerns roads constructed by virtue of this supplement, perform the same duties and have the same powers as by said act devolve upon the board of freeholders in respect to roads built under the aforesaid act.

**Maintenance
of roads.**

6. Every road constructed under the provisions of this supplement shall thereafter be maintained and kept in repair by the township or other municipality in which such road is situate, in the same manner in all respects as other public roads therein are or may be maintained and kept in repair, and none of the special provisions of the act to which this is a supplement, whereby said road shall be a county charge, shall be applicable to roads built by authority of this supplement.

7. This act shall take effect immediately.

Approved March 17, 1899.

DESTROYING POWER TO MANDAMUS.

CHAPTER 168.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whenever there shall be presented to the board of chosen freeholders of any county in this state any petition by the owners of lands praying the said board to cause any road or section thereof to be improved under the provisions of the act to which this is a supplement, it shall be the duty of such board of chosen freeholders, if they are satisfied that all the provisions and conditions of said act have been met and complied with in and by such petitions, to consider and to determine, by a vote of a majority of all the members constituting said board, whether the road or section mentioned in said petition is of sufficient general importance to warrant the expenditure of the county and state money for the improvement thereof; and said board of chosen freeholders is hereby authorized, by the vote of a majority of all the members constituting the said board, to grant the prayer of the said petition or to refuse the same if said board shall be of the opinion that the improvement is not of sufficient public importance or that the expense thereof will be an unnecessary public burden; *provided*, that this act shall in no way affect any proceeding heretofore taken to procure a mandamus in case of petition filed under said act.

2. All acts and parts of acts inconsistent with the provisions of this act be and the same are hereby repealed, and this act shall take effect immediately.

Approved April 14, 1896.

CHANGING LOCATION OR IMPROVING.

CHAPTER 75.

An Act to amend an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. The eighteenth section of the said act shall be amended so as to read as follows:

Property-owners to contribute whole expense of improvement.

18. That if any property owners or owner along any road in any county of this state which has not been improved or is not undergoing improvement under the previous sections of this act shall desire any section of any road in such county to be improved or to be changed in location and improved, and are or is willing to contribute the whole expense of such improvement, and provided every owner of land upon that part of the road proposed to be vacated under this act shall consent in writing to such vacation, the supervisor of roads of such county shall, upon a written request of such owners or owner, make a plan of such sections of roads so to be improved or changed in location and improved, in which shall be given the levels and distances, and also specifications stating the materials that may be used and the manner of using them; and a copy of such plan, location, change of location, specifications and of any bids to do such work shall then be submitted by such owners or owner to the board of chosen freeholders, and if such board shall approve them and any change of location which may be proposed, it shall then be lawful for such owners or owner to accept any bid or bids so approved from among the bidders, or at their own expense to proceed to build such section of road according to such plan, location and specifications,

and such owners or owner shall have control of the expenditure of moneys used to make such improvements, subject to the approval and supervision of the supervisor of such county; and, upon the completion of the improvement to the satisfaction of the said supervisor and said board of chosen freeholders, and upon the submission to said board of receipts showing full payment for materials furnished and work done under the plan and specifications, such section of road so improved shall, if the board of chosen freeholders shall so declare, thereafter be a county road, but otherwise shall remain an ordinary public highway, and any and all portions of any road now existing which may have been rendered unnecessary or be superseded by the new road so constructed shall be vacated and abandoned as a public road, without other action or proceedings than the approval of the board of chosen freeholders as hereinbefore provided; and the said supervisor shall be paid by the aforesaid owners or owner the sum of ten dollars for making the plan, the sum of five dollars for drawing the specifications, and the sum of five dollars for the supervision of the work, and in case such supervisor is not a civil engineer and actual survey is necessary, then such owners or owner, at their or his expense, shall procure a survey, which shall be subject to the approval of such supervisor, which survey shall take the place of the plan before mentioned, and shall include all the new roads proposed to be constructed and all the old roads proposed to be abandoned.

Owner to have control of expenditures.

Old road vacated.

Approved March 23, 1896.

INCREASED POWER TO BORROW.

An Amendment to an act entitled "A Supplement to an act entitled 'An act to enable boards of chosen freeholders to acquire, improve and maintain public roads,'" approved March nineteenth, one thousand eight hundred and eighty-nine, which supplement was approved April ninth, one thousand eight hundred and ninety-two.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

Section be amended.

1. The first section of an act entitled "A supplement to an act entitled 'An act to enable boards of chosen freeholders to acquire, improve and maintain public roads,'" approved March nineteenth, one thousand eight hundred and eighty-nine, which supplement was approved April ninth, one thousand eight hundred and ninety-two, be amended so as to read as follows:

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

Amount authorized to raise and bonds issued.

1. In counties of the second class it shall be lawful to raise a sum not to exceed four hundred thousand dollars, for which bonds may be issued by the board of chosen freeholders of any such county, under the act to which this is a supplement or any supplement or amendment thereof; *provided, however,* that if work under said act and supplements or amendments has already been done to an amount exceeding said sum, bonds under said act and supplements may be issued to an amount sufficient to raise and pay for such work; *and provided also,* that no county road bond shall be issued to such an amount as, in addition to existing debt, shall raise the debt of the county for all purposes above three per centum of the assessed value of the real estate therein; and in case any such bonds shall be issued in excess of the limit aforesaid, all such bonds so issued in excess shall be void in the hands of any

Proviso.

Proviso.

person or party, notwithstanding any recitals therein or any representations that may be made concerning the same; in case application has already been made to the circuit court and a certificate shall have been recorded and filed, as required by said act, such application need not be repeated in case of any subsequent issue of such bonds where the original certificate on file shows that the new issue of bonds will not exceed three per centum of the assessed value of the real estate in said county as limited by this act.

2. The second section of said act be amended so as to read as follows:

2. In any county of the second class wherein the board of chosen freeholders thereof shall heretofore or may hereafter issue bonds under said act and supplements, that such board of such county shall not use any of the money so raised for any other purpose except to grade, macadamize or improve any road in any such county, under the provisions of the act to which this is a supplement and the several supplements and amendments thereof; *provided*, nothing herein shall prohibit the doing of the necessary repair of any road heretofore graded, macadamized or improved by any such board or that may be hereafter graded, macadamized or improved under said act and supplements.

Board not to
use money
raised except
to grade, &c.

Proviso.

3. All acts and parts of acts inconsistent herewith be and the same are, so far only as they conflict herewith, repealed, and that this act shall take effect immediately.

Approved March 24, 1897.

CHAPTER 93.

POWER OF FREEHOLDERS TO BORROW.

A Supplement to an act entitled "An act in relation to county expenditures," approved April second, one thousand eight hundred and seventy-eight.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

Repair of roads
damaged by
freshets.

1. In case of the injury or destruction by freshets or otherwise of any of the roads or sections of roads in this state that have become county roads under and by virtue of any law of this state whereby it shall be deemed necessary for the board of chosen freeholders, within the limits of whose county such roads or sections of roads so injured or destroyed may lie, to repair or rebuild the same, the said board of chosen freeholders may order and cause such roads or sections of roads to be repaired or rebuilt, notwithstanding the expense of repairing or rebuilding the same shall exceed the limit of the appropriations made for that year; and such board of chosen freeholders may borrow money on temporary loans for that purpose in anticipation of the next tax levy; and in the said tax levy there shall be incorporated a special appropriation under the head of "debts and interest, special deficiency," to pay for such temporary loans.

Special charge.

2. This act shall take effect immediately.

Approved April 2, 1902.

CHAPTER 100.

A Supplement to an act entitled "An act to provide for the permanent improvement of public roads in this state," approved March twenty-second, one thousand eight hundred and ninety-five.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. Any road or street, or section of road or street, which constitutes the boundary line between two counties, may be acquired, improved and maintained in manner provided for in the act to which this act is a supplement.

Boundary road or street may be improved.

2. It shall be lawful for the board of chosen freeholders representing adjoining counties which are divided by any road, street or section of road or street, to jointly meet at such time and such place, in either county, as they agree upon, to consider and determine the question of acquiring, improving and maintaining said boundary road or street or section of road or street, according to the provisions of said act, to the best advantage of the public and the owners of property adjacent thereto; and to that end the said joint board are hereby authorized to prepare maps, plans and specifications, subject to the approval of the commissioner of public roads, for said improvement, which they shall deem necessary and proper for said purposes; the said joint board shall have power to employ a competent engineer or surveyor and such other assistance as they may deem necessary, and upon the completion of said maps, plans and specifications, duplicate copies thereof shall be filed in the office of the clerk of each of the counties affected thereby, and in the office of the commissioner of public roads.

Freeholders of adjoining counties may meet to consider improvements.

Prepare maps.

Employ engineer.

3. The said joint board may adopt a resolution directing the improvement, as provided for in said act, to be made, and thereupon said joint board shall have full power and authority to enter into contracts with

Make contract.

responsible persons for doing the work and furnishing the necessary materials therefor; they shall advertise for proposals in at least two newspapers published in each county, for at least three weeks, and their contracts shall be awarded to and made with the lowest responsible bidder who will comply with the requirements of the joint board and will give ample security for doing the work and performing the contract, but said joint board shall be under no obligation to accept the lowest bid, in which case all other bids will be thrown out and new proposals advertised for in the manner hereinbefore provided.

Payment.

4. The said joint board shall, on the certificate of the engineer and surveyor, and on such other evidence as they may require as to the work done and materials used and furnished for said improvement, order payments to be made to the contractor or contractors in the manner provided in said act.

**Expenses
equally di-
vided.**

5. All costs and expenses incurred in the proceedings hereinbefore authorized shall be borne and paid by each county in equal proportion, and the said joint board shall, after the completion of the contract and acceptance of the improvement, divide the road into two equal sections, and shall designate the section which each county shall maintain and keep in repair, and therefore each of said counties shall maintain and keep in repair the sections of the road so assigned to it.

Maintenance.**Method of
transacting
business by
joint board.**

6. Said joint board may choose a chairman and secretary and such other officers, and may make such rules for government as shall be deemed advisable; the said joint board shall have power to meet and adjourn from time to time, and as often as in their judgment it shall be deemed necessary to fully carry into effect the provisions of this act; the votes of a majority of the members of the board of each county voting separately shall be necessary to decide any question, order, motion or resolution which may come before the said joint board; the secretary of said joint board and the engineer and supervisor appointed shall receive such compensation for their services as the said joint board shall,

Compensation.

as aforesaid, determine to be just and proper; the members of said board shall be entitled to the same compensation as is allowed to them as members of the board of chosen freeholders, and shall comply with the provisions of and receive the benefits from the act to which this is a supplement, as far as the same is consistent and practical.

7. This act shall take effect immediately.

Approved March 23, 1898.

An Act to provide for the acquirement of turnpike roads for free public use.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. Whenever there shall be presented to the state commissioner of public roads a petition signed by the owners of at least two-thirds of the land and real estate fronting or bordering on any turnpike road, praying that said road may be acquired for free public use, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road shall be assessed thereon to an amount not exceeding ten per centum of the entire cost of the said road, then the governor shall appoint five commissioners from the county or counties through which the said road runs; the said commissioners, when appointed, shall take an oath or affirmation faithfully and fairly to perform their duties, and shall thereupon proceed to estimate and determine the fair and just value of the said road, having given ten days' notice of the time and place when and where they will meet to hear any representation in behalf of the said corporation or of the board or boards of chosen freeholders of the various counties through which the said turnpike runs, or of the applying freeholders in the said matter; said notice shall be served upon the president or other chief officer of said corporation, upon the director or clerk of the said

Turnpike roads may be acquired for public use.

Commissioners appointed.

Hearings had.

Notice given.

board or boards of chosen freeholders, and shall be published at least one week prior to the time of meeting in one newspaper published in each county through which said turnpike runs; such meeting shall be adjourned from time to time at the discretion of the said commissioners; when the said commissioners shall have arrived at a price or value of the said turnpike road satisfactory to themselves they shall report the same to the road commissioner, who may thereupon ratify the same and report it to the board or boards of chosen freeholders of the counties through which the said road runs, who may thereupon purchase the same; and they are hereby empowered to make temporary loans upon the credit of the said county or counties for the acquirement of the said roads as aforesaid.

Temporary
loans may be
made.

Cost.

Proviso.

2. One-third of the cost of all roads so acquired under this act shall be paid for out of the state road appropriation; *provided*, that the amount so paid shall not in any one year exceed the amount of twenty thousand dollars; if one-third of such cost shall exceed the sum of twenty thousand dollars the said sum of twenty thousand dollars shall be apportioned by the governor and the state commissioner of public roads among the counties of this state in proportion to the cost of the roads acquired by them for such year, as shown by the statement of cost filed in the office of the state commissioner of public roads; the governor and the said commissioner shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified to as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated; *provided, further*, that the cost of all turnpike roads acquired under this act in any county in any one year, together with all roads built or repaired, shall not exceed one-fourth of one per centum of the ratables of such county for the last preceding year.

Proviso.

3. On or before August first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, the two-thirds of the cost of all turnpike roads acquired so as aforesaid during the year, and the county board of assessors shall include the sum so certified in the county taxes assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the receipt of less than one-third of the cost from the state treasury, the board of chosen freeholders shall have authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county.

Assessors to include certain amount in county taxes.

Deficiency.

4. If the said road shall run through more than one county the petition to the state commissioner of public roads shall be signed by at least two-thirds of the owners of the land and real estate bordering on said road in each county before the governor shall be required to appoint the five commissioners mentioned in the first section of this act; and each of the said counties shall bear the expenses of the acquirement of the said road in proportion to the length thereof within the said counties, and all proceedings after the appointment of the said five commissioners that may be required by virtue of this act shall be had separately and independently in each of the said counties.

If the road is in more than one county.

5. Any road so acquired shall forever thereafter be a free county road, and the duty of keeping the same in good order and repair shall devolve upon the county officers in like manner as heretofore provided for free stone roads.

Road to be free and maintained by county.

6. When the said turnpike roads shall have been so acquired the board of chosen freeholders shall apply to the circuit court of the county for the appointment of commissioners to estimate and assess the peculiar benefits conferred by such acquirement upon the lands and

Benefits assessed by commissioners appointed by court.

real estate bordering on the road so acquired, of the time and place of which application notices shall be given by ten days' publication in two daily newspapers printed and circulating within the said counties, then by two weeks' publication in two weekly newspapers printed and circulating therein, at which time and place or at such other time and place as the court shall designate, shall, without unnecessary delay, appoint three commissioners who shall be freeholders, and residents of the county in which the application is made, to assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place and also to fill any vacancy that may occur in the office of any commissioner at any time.

Method of assessing benefits.

7. The said commissioners shall then proceed in like manner as the commissioners appointed to assess the benefits conferred by the improvement of the public roads of this state under and by virtue of an act of the legislature entitled "An act to provide for the permanent improvement of the public roads of this state," approved March twenty-second, one thousand eight hundred and ninety-five, and the supplements thereto, and the report of the said commissioners when filed and approved shall be a lien upon the properties assessed in like manner, and the said assessment shall be collected in like manner as the assessment in the said act last before mentioned.

8. This act shall take effect immediately.

Approved May 11, 1897.

CHAPTER 132.

An Act to provide for the acquirement of turnpike roads for free public use, and for the permanent improvement and maintenance of the same.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. Whenever there shall be presented to the state commissioner of public roads a petition signed by the owners of at least two-thirds of the land and real estate fronting or bordering on any turnpike road, praying that said road may be acquired for free public use, and setting forth that they are willing that the peculiar benefits conferred on the lands fronting or bordering on said road shall be assessed thereon to an amount not exceeding ten per centum of the entire purchase price of the said road, together with the amount necessary to resurface, rebuild or improve the said road in the manner prescribed for other roads in the act entitled "An act to provide for the permanent improvement of the public roads in this state," approved March twenty-second, anno domini one thousand eight hundred and ninety-five, and the supplements thereto, said commissioner shall thereupon notify the governor of such action and the governor shall thereupon appoint five commissioners from the county or counties through which the said road runs; the said commissioners when appointed shall take an oath or affirmation faithfully and fairly to perform their duties, and shall thereupon proceed to estimate and determine the fair and just value of the said road and of the portions thereof in each county in which the same is located, having given ten days' notice of the time and place when and where they will meet to hear any representation in behalf of the said corporation or of the board or boards of chosen freeholders of the various counties through which the said road runs, or of the applying freeholders in the said matter; said notice shall be served upon the president or other chief officer of the turnpike company upon the director of the said board or boards of chosen freeholders, and shall be published at least one week prior to the time of meeting in one newspaper published in each county through which said turnpike runs; such meeting shall be adjourned from time to time at the discretion of the said commissioners; when the said commissioners shall have arrived at a price or value of the said turnpike road satisfactory to themselves they

Acquirement
of turnpike
road for free
public use.

App intment
of commission-
ers by gov-
ernor.

Hearing.

Report to state
commissioner
of roads.

shall report the same to the state commissioner of public roads, who may thereupon ratify the same and report it to the board or boards of chosen freeholders of the counties through which the said road runs, which said board may thereupon purchase the same or whenever the board of chosen freeholders of any county in this state shall agree with the owner or owners of any turnpike road or toll road within such county upon the price to be paid for such turnpike road or toll road, and shall by resolution accept the same, and said proceeding be approved by the state commissioner of public roads in writing, said board may thereupon purchase the same and said road shall be paid for and maintained as a county road as hereinafter provided for; and they are hereby empowered to make temporary loans upon the credit of the said county or counties for the acquirement of the said roads as aforesaid.

One-third paid
from state ap-
propriation.

Proviso.

2. One-third of the cost of all roads so acquired, together with one-third of the amount expended in improving the same as aforesaid, which improvement shall be made in the manner prescribed for the roads under the aforesaid act, shall be paid for out of the state road appropriation; *provided*, that the amount so paid shall not in one year exceed the amount of forty thousand dollars; if one-third of such cost shall exceed the sum of forty thousand dollars, the said sum of forty thousand dollars shall be appropriated by the governor and state commissioner of public roads among the counties of this state in proportion to the cost of the roads acquired by them for such year as shown by the statement of cost filed in the office of the state commissioner of public roads; the governor and the said commissioner shall, between December fifteenth and thirty-first in each year, certify to the state comptroller the amount to be paid to each county for such year, and the state comptroller shall thereupon draw his warrants in favor of the respective county collectors for the sums certified to as aforesaid upon the state treasurer, who shall pay the same out of any moneys in the state treasury not otherwise appropriated; *provided further*, that the cost

Proviso.

of all turnpike roads acquired under this act in any county in any one year, together with all roads built or repaired, shall not exceed one-half of one per centum of the ratables of such county for the last preceding year.

3. On or before August first in each and every year it shall be the duty of the board of chosen freeholders to certify to the county board of assessors, either in the annual tax budget or separately, the two-thirds of the cost of purchasing and improving of all turnpike roads acquired and improved as aforesaid during the year, and the county board of assessors shall include the sum so certified in the county tax assessed for such year, and the same shall be assessed, collected and paid over to the county in the same manner and within the same time that other county taxes are assessed, collected and paid over; if a deficiency shall exist in consequence of the receipt of less than one-third of the cost from the state treasury, the board of chosen freeholders shall have authority to borrow on temporary loans to the amount of such deficiency until the next annual taxes shall be assessed, collected and paid over to the county.

Duty of county board of assessors.

Loan to meet deficiency.

4. If the said road shall run through more than one county the petition to the state commissioner of public roads shall be signed by at least two-thirds of the owners of the land and real estate bordering on said road in each county before the governor shall be required to appoint the five commissioners mentioned in the first section of this act; and each of the said counties shall bear the expense of the acquirement of the said road in proportion to the value thereof within the said counties, and all proceedings after the appointment of the said five commissioners that may be required by virtue of this act shall be had separately and independently in each of the said counties.

When turnpike in two or more counties.

5. Any road so acquired shall forever thereafter be a free county road, and shall be kept in good order and repair and in the same manner as are other county roads.

Maintenance.

**Assessment of
benefits.**

6. When the said turnpike roads shall have been so acquired and improved by petition as aforesaid the board of chosen freeholders shall apply to the circuit court of the county for the appointment of commissioners to estimate and to assess the peculiar benefits conferred by such acquirement and improvement upon the lands and real estate bordering on the road so acquired and improved, of the time and place of which application notices shall be given by ten days' publication in two daily newspapers printed and circulating within the said counties, or by four weeks' publication in two weekly newspapers printed and circulating therein, at which time and place, or such other time and place as the court shall designate, shall, without unnecessary delay, appoint three commissioners, who shall be freeholders and residents of the county in which the application is made, to assess the benefits aforesaid; the said court shall have power to remove any commissioner and appoint another in his place, and also fill any vacancy that may occur in the office of any commissioner at any time.

**Manner of as-
sessment.**

7. The said commissioners shall then proceed in like manner as the commissioners appointed to assess the benefits conferred by the improvement of the public roads of this state under and by virtue of an act of the legislature entitled "An act to provide for the permanent improvement of the public roads of this state," approved March twenty-second, one thousand eight hundred and ninety-five, and supplements thereto, and the report of the said commissioners when filed and approved shall be a lien upon the properties assessed in like manner, and the said assessment shall be collected in like manner as the assessment in the said act last before mentioned.

Report a lien.

8. This act shall take effect immediately.

Approved March 22, 1901.

VACATION OF TURNPIKE.

SUPPLEMENT.

Approved February 13, 1884.

Sec. 1. That whenever any turnpike company of this state shall execute to any city, township or other municipality of this state, a deed of cession and transfer of all or any part of any turnpike road lying within the limits of any such city, township or other municipality, and shall have the same duly proven in the manner required for the proof of deeds or conveyances of lands, and shall deliver the same, together with a map or survey of the road, or of the part of road so ceded and transferred to the common council, township committee or other governing board of such city, township or other municipality, and the said common council, township committee or other governing board shall accept the said deed of cession and transfer, by a writing indorsed thereon, the said deed, proof, map or survey and acceptance shall then be recorded in the office of the clerk of the county in which the road so ceded and transferred lies, in the book containing the records of public roads for said county, and after being so recorded shall be filed in the office of the secretary of state; *provided*, that where the charter or act of incorporation of any city or other municipality prescribes the manner in which deeds of dedication of lands for public highways or streets shall be accepted, the proceedings for the acceptance of any deed of cession and transfer by a turnpike company as aforesaid shall, in any such city or other municipality, be the same as is required for the acceptance of a deed of dedication of lands for a public highway or street.

Deed of cession and transfer of turnpike road how executed and filed.

Proviso.

Sec. 2. That any turnpike company making a cession and transfer of any part of their turnpike road in the manner aforesaid, shall, from the date of filing the deed of cession and transfer in the office of the secretary

Company released from control, &c., of part of road ceded when deed is filed in office of secretary of state.

of state, be released and discharged from all authority and control over the part or parts of their road so ceded and transferred, and from all liability on account of the same, and the same shall thereafter be to all intents and purposes a public road or highway in such city, township or other municipality, and be subject to the same jurisdiction, authority and control by such city, township or other municipality, as it has over other public roads or highways within the limits thereof.

An Act authorizing turnpike companies to vacate or dispose of a portion of its road and property.

Approved April 20, 1885.

When turnpike
company may
vacate or dis-
pose of portion
of road.

Sec. 1. That when any turnpike company in this state may deem it advisable to dispose or vacate any portion of their road not in excess of one-half of its entire length, they shall hereby have the power and privilege of so doing at any time when the same may be favored by a vote represented by those owning two-thirds of the capital stock of said company, to be voted at a special meeting of said stockholders called by the officers of said company, and the notice of said meeting being published in at least one newspaper in each county where said road is located, for the space of thirty days, once in each week, said notice to state the time and object of said meeting; the said stockholders may, by a vote represented by those owning two-thirds of the capital stock of said company, authorize and empower their president and secretary to sell or vacate to the freeholders of the county or counties the portion so desired; and if vacated without compensation, a committee of the board of freeholders of the county or counties may view the same and report to the said board upon what terms they have agreed to take said road, and the action of a majority of said board of freeholders in accepting or rejecting said report shall be final.

An Act to authorize turnpike companies to abandon a portion of their roads and property.

Passed June 1, 1886.

Sec. 1. That any turnpike company in this state may abandon any portion of their road not exceeding two-thirds of the entire length of the road, when the same may be favored by a vote of those owning a majority of the capital stock of said company; the resolution to abandon a portion of said turnpike shall describe the part so abandoned, and shall be signed by the president and secretary of said turnpike company, duly acknowledged before an officer authorized to take the acknowledgement of deeds in this state, and shall thereupon be recorded in the office of the clerk of the county wherein such turnpike company is situated; *provided*, that the part of said turnpike so abandoned shall be in all respects in as good repair as when the said company began operating the same.

Turnpike companies may abandon portion of road.

BROAD TIRES.

CHAPTER 76.

An Act to amend an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes."

1. *BE IT ENACTED by the Senate and General Assembly of the State of New Jersey*, That section one of an act entitled "An act to enable township committees to encourage the use of broad tires on wagons and carts by a rebatement of taxes," approved March sixteenth, one thousand eight hundred and ninety-three, which reads as follows:

1. *BE IT ENACTED by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when in their

judgment it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed fifty cents for each wheel in use in any one year," be and the same is hereby amended so as to read as follows:

1. BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*, That township committees be and they are hereby authorized, when, in their judgment, it is for the public good, to pass an ordinance allowing a rebate of taxes for township or road purposes to all owners or possessors of wagons and carts used in said township for transportation of goods, wares, merchandise, produce, passengers, and for general farm, freight and express purposes, having tires of not less than four inches in width; *provided*, the said rebate shall not exceed one dollar for each wheel in use in any one year.

2. That this act shall take effect immediately.

Passed March 24, 1896.

CHAPTER 63.

A Supplement to an act entitled "An act to provide for the acquirement of turnpike roads for free public use," approved May eleventh, one thousand eight hundred and ninety-seven.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey*:

Compensation.

1. The pay of the commissioners heretofore or hereafter appointed under said act shall be a sum not exceeding five dollars per day, and necessary expenses not

exceeding two dollars per day, for actual number of days employed in such service.

2. If the freeholders of the county or counties fail to accept the turnpike roads appraised under the act to which this is a supplement within twelve months after the commission have submitted their award to the state road commissioner, the bill of said commissioners, upon the approval of the state road commissioner and the signature of the governor, shall be presented to the comptroller of the state, who thereupon shall draw his warrant therefor upon the state treasurer, who shall pay the same out of the annual state appropriation for roads.

Settlement
when road not
accepted.

3. This act shall take effect immediately.

Approved March 20, 1900.

CHAPTER 98.

Further Supplement to an act entitled "An act concerning roads," approved April sixteenth, eighteen hundred and forty-six.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

1. The owner or occupant of land abutting on any highway in any township in this state shall, during the month of September of each year, cut and remove all brush, briars and weeds growing in or upon such portion of such highway as his or her lands abut upon, and in case such owner or occupant shall fail to perform the duty imposed hereby, the township committee of the township in which such lands abut as aforesaid shall cause such work to be done and the owner of such lands shall pay the expense thereof, with costs, to be recovered in an action upon contract before any justice of the peace of the county at the suit of such township committee.

Highway must
be kept clear of
weeds, &c.

2. This act shall take effect immediately.

Approved March 23, 1900.

An Act for the better protection of travelers, pedestrians, vehicles and animals on the public streets and highways.

BE IT ENACTED *by the Senate and General Assembly of the State of New Jersey:*

Penalty for placing glass, bottles, &c., upon public highways.

1. Whoever places upon the surface of any public street, highway or other way customarily and lawfully used for public travel, or upon any sidewalk appurtenant to such way, any broken glass, bottle, metal, loose stones, earthenware, or other substance of a nature likely to cause injury to travelers or pedestrians, or to carriages, bicycles or other vehicles traveling or moving on said way, or which might wound, disable or injure any horse or other animal, or which might injure, cut or puncture any pneumatic tire, shall forfeit for each offense five dollars, to be sued for and recovered in an action of debt by any person who will sue for the same.

Broken stone of dimension of one inch or more placed on highways to be covered.

2. Any overseer of the highways, committeeman, contractor, or other person whomsoever, who shall place or spread broken stone on any of the highways of this state, for the purpose of improving or repairing the same, shall, if such stone be of the dimension of an inch and one-half or more in diameter, cause the same to be covered with fine stone, earth or screenings, within such period of time as it shall be possible to obtain such fine stone, earth or screenings after said broken stones are spread upon said road, unless prevented by causes beyond his control, under a penalty of twenty dollars for each offense, to be sued for in an action of debt and recovered with costs by any person who shall be injuriously affected by the willful neglect or failure to cover said stone as herein provided.

3. This act shall take effect immediately.

Approved May 12, 1896.

APPENDIX C.

NEW JERSEY.

1. All taxes are to be paid in money.
2. The office of overseer of highway is abolished.
3. The roads of a township are placed under the management of the township committee, and money may be raised by township bonds for grading, macadamizing and improving the same; bonds to be authorized by vote at the annual town meeting.
4. Under the County act, the Board of Chosen Freeholders of any county may designate certain roads as county roads, and improve the same by the issue of county bonds; townships to pay one-third of the cost.
5. Under the County State Aid law, the freeholders may declare any road a county road, and by resolution improve same, or whenever the owners of two-thirds of the lands fronting on any public road will undertake to pay one-tenth of the cost of improving such road, the Board of Chosen Freeholders may cause such improvements to be made, the State paying one-third of the cost up to, at present, the limit of \$250,000 per year.

Under the Township State Aid law, whenever the owners of two-thirds of the lands fronting on any public road will undertake to pay one-tenth of the cost of improving the same, the township committee may cause such improvements to be made, the State paying one-third of the cost, less the ten per cent., and the township 67 per cent., the township forever keeping the road in repair.
6. Under the act for the acquirement of turnpike roads for free public use, whenever the owners of two-thirds of the land fronting on any turnpike toll-road

pray that said road may be acquired for free public use, and that they are willing to pay ten per cent. of the entire cost of such road, the Governor appoints five commissioners to estimate and determine the fair and just value of said road; after having arrived at such value, if the State Road Commissioner ratifies the same, the board may purchase, the State paying one-third of the cost and the county paying the balance, fifty-seven per cent., or whenever the Board of Chosen Freeholders of any county in this State shall agree with the owner or owners of any turnpike road or toll road within such county upon the price to be paid for such turnpike road or toll road, and shall by resolution accept the same, and said proceeding be approved by the State Commissioner of Public roads in writing, said board may thereupon purchase the same.

7. Whenever the Board of Chosen Freeholders purchases a turnpike road and the State Commissioner of Public Roads approves of the same, the State pays one-third of the cost.

LAYING OUT ROADS.

Receiving many inquiries how to proceed to lay out roads, change location, &c., to save correspondence we give the following quotations from the statutes:

Laying out Roads by Freeholders after General Election.

It shall be lawful for the Board of Chosen Freeholders of any of the several counties of this State when said board deem it for the best interests of such county, to lay out, construct and maintain public roads extending through such county in any direction, to submit, by resolution, the question whether or not such public roads shall be laid out, to the electors of said county, at an election, to be held at the same time and place of holding the general election in and for said county for members of the General Assembly of this State, by the same officers, but in separate ballot-box, and if, at such

election, a majority of the electors shall vote "against public roads," nothing in this act shall apply or be effective in said county; but if a majority of the electors vote "in favor of public road," then the board shall proceed as directed by the act entitled "An act to authorize the board of chosen freeholders of any of the several counties of this state to lay out, open, construct, improve and maintain a public road therein," approved April 7th, 1888. P. L. 1888, page 397.

LAYING OUT, VACATING OR ALTERING PUBLIC ROADS BY
SURVEYORS OF HIGHWAYS. (Revised Statutes,
page 2828-119, Sec. 1.)

That when ten or more persons, being freeholders, shall think a public road necessary, or any public road which hath been or shall be laid out unnecessary, or any alteration in such road necessary in any part of the county in which they reside, it shall be lawful for the said persons to make application in writing to the inferior court of common pleas of the said county, in open court, having given previous notice for at least ten days of such intended application, and also of the day on which such application is intended to be made, by advertisements under their hands, and set up at three of the most public places in the township in which the said road is proposed to be laid out, vacated or altered, and if there be more townships than one through which the said road may run, by advertisements to be set up at three of the most public places in each township; and the said court, when applied to as aforesaid, on due proof being made that the advertisements have been set up according to law, on which the judgment of the court shall be final and conclusive, are hereby authorized and required to appoint six of the surveyors of the highways of the said county, ever having regard to the appointment of the surveyors of the highways of the township or townships where the said road shall be so applied for to be laid out, vacated or altered;

provided, that no surveyor shall be appointed through whose land the road may run, or who for any other reason which the court in their discretion shall deem sufficient, think ought not to be appointed; and the said surveyors shall meet at such time and place as the said court shall direct, a copy of which appointment shall be served on each of the said surveyors at least six days prior to the time of their meeting; and two of the said applicants shall, at least twelve days prior to the said time, sign and set up advertisements at three of the most public places in the said township or townships, setting forth the time and place of the meeting of the surveyors agreeably to the directions of the court, and designating the points or places from and to which the said road is proposed to be laid out, vacated or altered. (See Secs. 138 and 168, *post*.)

VACATION AND RELAYING OF PUBLIC ROADS BY FILING
CONSENT WITH CLERK AND RECORDING.

138. Sec. 1. That whenever ten or more persons, being freeholders, shall think any alteration of any public road necessary in any part of the county wherein they reside, by having such road or a portion thereof vacated, and the same relaid or another road substituted therefor, they may make application in writing to the inferior court of common pleas of such county, or to one of the judges thereof, setting forth in writing the road or portion thereof as aforesaid which it is proposed to have vacated, describing the same by courses and distances, and also describing the road as it is to be relaid, or the road which is to be substituted therefor, to which description there shall be attached a map showing the location of the road or portion of road to be vacated and the road as relaid, or the road which is to be substituted therefor; and if within ten days after such application shall have been made as aforesaid, or if at the time of making such application there shall be presented to said court or judge the consent in writing

of the owners of all the lands intersected by such old road or portion thereof proposed to be vacated, and of all the property intersected by the road as proposed to be relaid, or by the road which it is proposed to substitute therefor, and also the written consent of the township committee of the township wherein such road or roads do lie, that said application shall be granted, then it shall be lawful for said court or judge to cause said application, with the accompanying survey, map and return, and the written consents of the owners of lands as aforesaid, and of the township committee, to be filed with the clerk of the county, to be by him recorded in the book of roads for said county; and when said application and other papers shall have been so filed, such old road or portion thereof shall thereupon and thereby be deemed to be vacated, and the road is relaid, or the new road substituted therefor, shall thereupon and thereby be deemed and taken to be a public road.

VACATION OF PUBLIC ROADS BY CONSENT AND FILING
WITH COUNTY CLERK.

186. Sec. 1. That whenever ten or more persons, being freeholders, shall think the vacation of a part of any public road necessary in any part of the county wherein they reside, they may make application in writing to the inferior court of common pleas of such county, or to one of the judges thereof, setting forth in writing the road or portion thereof which it is proposed to have vacated, describing the same by courses and distances, to which description there shall be attached a map showing the location of the road, or portion thereof to be vacated, and if within ten days after such application shall have been made as aforesaid, or if at the time of making such application, there shall be presented to said court or judge the consent in writing of the owners of all the lands by such old road or portion thereof proposed to be vacated, and also the written consent of the township committee of the township

wherein such lands do lie, that such application shall be granted, then it shall be lawful for said court or judge to cause said application, with the accompanying survey, map and return, and the written consents of the owners of lands as aforesaid, and of the township committee to be filed with the clerk of the county to be by him recorded in the book of roads for said county, and when said application and papers have been so filed, such portion of such old road shall thereupon and thereby be deemed to be vacated; *provided*, that no portion of any old road proposed to be vacated under this act shall exceed one thousand yards in length.

APPENDIX D.

Number of tons of stone per mile required to build the following depths and widths.

For the information of intending road builders, we have compiled the following tables, which approximate the number of tons of thoroughly-rolled stone necessary to construct each mile at the designated depths and widths.

The basis is 3,000 tons of loose stone or 3,500 tons of compressed stone for a road one mile long, sixteen feet wide and eight inches deep. A road eight inches deep, when finished, will have required at least ten inches of stone. It should be placed in two layers of five inches each, and each layer rolled down to four inches. Then the application of the three-quarter inch and screenings will bring the road to the prescribed depth; for other thickness the stone should be placed in proportion to the intended finished depths.

An observance of this rule will insure the contract thickness for the roadbed, and save the sometimes necessary expense of resurfacing before acceptance from the contractor.

A road	8 feet wide and 4 inches deep will require					875	tons of stone per mile.			
"	8	"	"	6	"	"	1,312½	"	"	"
"	8	"	"	8	"	"	1,750	"	"	"
"	8	"	"	10	"	"	2,187½	"	"	"
"	8	"	"	12	"	"	2,625	"	"	"
"	9	"	"	4	"	"	984¾	"	"	"
"	9	"	"	6	"	"	1,476 9-16	"	"	"
"	9	"	"	8	"	"	1,968¾	"	"	"
"	9	"	"	10	"	"	2,460 15-16	"	"	"
"	9	"	"	12	"	"	2,953¾	"	"	"
"	10	"	"	4	"	"	1,093¾	"	"	"
"	10	"	"	6	"	"	1,640½	"	"	"
"	10	"	"	8	"	"	2,187½	"	"	"
"	10	"	"	10	"	"	2,734¾	"	"	"
"	10	"	"	12	"	"	3,281¼	"	"	"

A road 11 feet wide and 4 inches deep will require						1,203½ tons of stone per mile.		
"	11	"	"	6	"	"	1,804	11-16 " " "
"	11	"	"	8	"	"	2,406½	" " "
"	11	"	"	10	"	"	3,007	13-16 " " "
"	11	"	"	12	"	"	3,609%	" " "
"	12	"	"	4	"	"	1,312½	" " "
"	12	"	"	6	"	"	1,968%	" " "
"	12	"	"	8	"	"	2,625	" " "
"	12	"	"	10	"	"	3,281½	" " "
"	12	"	"	12	"	"	3,937½	" " "
"	13	"	"	4	"	"	1,421%	" " "
"	13	"	"	6	"	"	2,132	13-16 " " "
"	13	"	"	8	"	"	2,843%	" " "
"	13	"	"	10	"	"	3,554	11-16 " " "
"	13	"	"	12	"	"	4,265%	" " "
"	14	"	"	4	"	"	1,531½	" " "
"	14	"	"	6	"	"	2,296%	" " "
"	14	"	"	8	"	"	3,062½	" " "
"	14	"	"	10	"	"	3,828½	" " "
"	14	"	"	12	"	"	4,593%	" " "
"	15	"	"	4	"	"	1,640%	" " "
"	15	"	"	6	"	"	2,460	15-16 " " "
"	15	"	"	8	"	"	3,281½	" " "
"	15	"	"	10	"	"	4,101	9-16 " " "
"	15	"	"	12	"	"	4,921%	" " "
"	16	"	"	4	"	"	1,750	" " "
"	16	"	"	6	"	"	2,625	" " "
"	16	"	"	8	"	"	3,500	" " "
"	16	"	"	10	"	"	4,375	" " "
"	16	"	"	12	"	"	5,250	" " "
"	17	"	"	4	"	"	1,859%	" " "
"	17	"	"	6	"	"	2,789	1-16 " " "
"	17	"	"	8	"	"	3,718%	" " "
"	17	"	"	10	"	"	4,648	7-16 " " "
"	17	"	"	12	"	"	5,578½	" " "
"	18	"	"	4	"	"	1,968%	" " "
"	18	"	"	6	"	"	2,953½	" " "
"	18	"	"	8	"	"	3,937½	" " "
"	18	"	"	10	"	"	4,921%	" " "
"	18	"	"	12	"	"	5,906½	" " "
"	19	"	"	4	"	"	2,078½	" " "
"	19	"	"	6	"	"	3,117	3-16 " " "
"	19	"	"	8	"	"	4,156½	" " "
"	19	"	"	10	"	"	5,195	5-16 " " "
"	19	"	"	12	"	"	6,234%	" " "
"	20	"	"	4	"	"	2,187½	" " "
"	20	"	"	6	"	"	3,281½	" " "
"	20	"	"	8	"	"	4,375	" " "
"	20	"	"	10	"	"	5,468%	" " "
"	20	"	"	12	"	"	6,562½	" " "

TABLES.

As many persons interested in the construction of stone roads are asking questions about their cost, we enclose a table to show at a glance the number of square yards at different widths in a mile of road; also the cost at different widths and various prices per square yard. Any variations from these prices can be quickly ascertained by adding, subtracting, multiplying and dividing for a less or greater width. For example, a road eight feet wide has 4,693 1-3 square yards in one mile. To obtain the number of square yards in a road having a width of nine feet, add one-eighth to the foregoing figures, and in one having a width of seven feet, subtract one-eighth; in one of twice the width given in the table multiply by two.

SQUARE YARDS IN ONE MILE OF

8 feet in width.....	4,693 1-3 square yards.
10 "	5,866 2-3 "
12 "	7,040 "
14 "	8,213 1-3 "
16 "	9,386 2-3 "
18 "	10,560 "
8 feet wide, or 4,693 1-3 square yards, at 25c. per yard.....	\$1,173 33 1-3
10 " 5,866 2-3 " 25c. "	1,466 66 2-3
12 " 7,040 " 25c. "	1,760 00
14 " 8,213 1-3 " 25c. "	2,053 33 1-3
16 " 9,386 2-3 " 25c. "	2,346 66 2-3
18 " 10,560 " 25c. "	2,640 00
8 " 4,693 1-3 " 30c. "	\$1,408 00
10 " 5,866 2-3 " 30c. "	1,760 00
12 " 7,040 " 30c. "	2,112 00
14 " 8,213 1-3 " 30c. "	2,464 00
16 " 9,386 2-3 " 30c. "	2,816 00
18 " 10,560 " 30c. "	3,168 00
8 " 4,693 1-3 " 35c. "	\$1,642 66 2-3
10 " 5,866 2-3 " 35c. "	2,053 33 1-3
12 " 7,040 " 35c. "	2,464 00
14 " 8,213 1-3 " 35c. "	2,874 66 2-3
16 " 9,386 2-3 " 35c. "	3,285 33 1-3
18 " 10,560 " 35c. "	3,696 00
8 " 4,693 1-3 " 40c. "	\$1,877 33 1-3
10 " 5,866 2-3 " 40c. "	2,346 66 2-3
12 " 7,040 " 40c. "	2,816 00
14 " 8,213 1-3 " 40c. "	3,285 33 1-3
16 " 9,386 2-3 " 40c. "	3,754 66 2-3
18 " 10,560 " 40c. "	4,224 00

8 feet wide, or 4,693 1-3 square yards, at 45c. per yard.....						\$2,112 00
10	"	5,866 2-3	"	45c.	"	2,640 00
12	"	7,040	"	45c.	"	3,168 00
14	"	8,213 1-3	"	45c.	"	3,696 00
16	"	9,386 2-3	"	45c.	"	4,224 00
18	"	10,560	"	45c.	"	4,752 00
8	"	4,693 1-3	"	50c.	"	\$2,346 66 2-3
10	"	5,866 2-3	"	50c.	"	2,933 33 1-3
12	"	7,040	"	50c.	"	3,520 00
14	"	8,213 1-3	"	50c.	"	4,106 66 2-3
16	"	9,386 2-3	"	50c.	"	4,693 33 1-3
18	"	10,560	"	50c.	"	5,280 00
8	"	4,693 1-3	"	55c.	"	\$2,581 33 1-3
10	"	5,866 2-3	"	55c.	"	3,226 66 2-3
12	"	7,040	"	55c.	"	3,872 00
14	"	8,213 1-3	"	55c.	"	4,517 33 1-3
16	"	9,386 2-3	"	55c.	"	5,162 66 2-3
18	"	10,560	"	55c.	"	5,808 00
8	"	4,693 1-3	"	60c.	"	\$2,816 00
10	"	5,866 2-3	"	60c.	"	3,520 00
12	"	7,040	"	60c.	"	4,224 00
14	"	8,213 1-3	"	60c.	"	4,928 00
16	"	9,386 2-3	"	60c.	"	5,632 00
18	"	10,560	"	60c.	"	6,336 00
8	"	4,693 1-3	"	65c.	"	\$3,050 66 2-3
10	"	5,866 2-3	"	65c.	"	3,813 33 1-3
12	"	7,040	"	65c.	"	4,576 00
14	"	8,213 1-3	"	65c.	"	5,338 66 2-3
16	"	9,386 2-3	"	65c.	"	6,101 33 1-3
18	"	10,560	"	65c.	"	6,864 00
8	"	4,693 1-3	"	70c.	"	\$3,285 33 1-3
10	"	5,866 2-3	"	70c.	"	4,106 66 2-3
12	"	7,040	"	70c.	"	4,928 00
14	"	8,213 1-3	"	70c.	"	5,749 33 1-3
16	"	9,386 2-3	"	70c.	"	6,570 66 2-3
18	"	10,560	"	70c.	"	7,392 00
8	"	4,693 1-3	"	75c.	"	\$3,520 00
10	"	5,866 2-3	"	75c.	"	4,400 00
12	"	7,040	"	75c.	"	5,280 00
14	"	8,213 1-3	"	75c.	"	6,160 00
16	"	9,386 2-3	"	75c.	"	7,040 00
18	"	10,560	"	75c.	"	7,920 00
8	"	4,693 1-3	"	80c.	"	\$3,754 66 2-3
10	"	5,866 2-3	"	80c.	"	4,693 33 1-3
12	"	7,040	"	80c.	"	5,632 00
14	"	8,213 1-3	"	80c.	"	6,570 66 2-3
16	"	9,386 2-3	"	80c.	"	7,509 33 1-3
18	"	10,560	"	80c.	"	8,448 00

8 feet wide, or 4,693 1-3 square yards, at 85c. per yard.....						\$3,989 33 1-3
10	"	5,866 2-3	"	85c.	"	4,986 66 2-3
12	"	7,040	"	85c.	"	5,984 00
14	"	8,213 1-3	"	85c.	"	6,981 33 1-3
16	"	9,386 2-3	"	85c.	"	7,978 66 2-3
18	"	10,560	"	85c.	"	8,976 00
8	"	4,693 1-3	"	90c.	"	\$4,224 00
10	"	5,866 2-3	"	90c.	"	5,280 00
12	"	7,040	"	90c.	"	6,336 00
14	"	8,213 1-3	"	90c.	"	7,392 00
16	"	9,386 2-3	"	90c.	"	8,448 00
18	"	10,560	"	90c.	"	9,504 00
8	"	4,693 1-3	"	95c.	"	\$4,458 66 2-3
10	"	5,866 2-3	"	95c.	"	5,573 33 1-3
12	"	7,040	"	95c.	"	6,688 00
14	"	8,213 1-3	"	95c.	"	7,802 66 2-3
16	"	9,386 2-3	"	95c.	"	8,917 33 1-3
18	"	10,560	"	95c.	"	10,032 00
8	"	4,693 1-3	"	\$1 00	"	\$4,693 33 1-3
10	"	5,866 2-3	"	1 00	"	5,866 66 2-3
12	"	7,040	"	1 00	"	7,040 00
14	"	8,213 1-3	"	1 00	"	8,213 33 1-3
16	"	9,386 2-3	"	1 00	"	9,386 66 2-3
18	"	10,560	"	1 00	"	10,560 00

TABLE FOR GRAVEL.

Table showing number of cubic yards of gravel required in the construction of one mile of gravel road, of widths varying from 6 feet to 20 feet, and depth from 6 to 12 inches. The within quantities should be multiplied by $1\frac{1}{4}$ to give the number of cubic yards of loose gravel required to make the within depths of compact gravel.

ONE MILE IN LENGTH.		Number of feet in width.	Number of cubic yards in road						Number of cubic yards in road					
One mile.	"		6	8	10	12	14	16	18	20	6	8	10	12
One mile.	"	6 ft. wide.	684	782	880	977	1,075	1,173	1,271	1,368	1,466	1,564	1,662	1,760
"	"	7 "	798	912	1,026	1,140	1,254	1,368	1,482	1,597	1,711	1,825	1,939	2,053
"	"	8 "	912	1,042	1,173	1,303	1,434	1,564	1,694	1,825	1,955	2,085	2,216	2,346
"	"	9 "	1,026	1,173	1,320	1,466	1,613	1,760	1,906	2,053	2,200	2,346	2,493	2,640
"	"	10 "	1,140	1,303	1,466	1,629	1,792	1,955	2,118	2,281	2,444	2,607	2,770	2,933
"	"	11 "	1,254	1,434	1,613	1,792	1,971	2,151	2,330	2,509	2,688	2,867	3,047	3,226
"	"	12 "	1,368	1,564	1,760	1,955	2,151	2,346	2,542	2,737	2,933	3,128	3,324	3,520
"	"	13 "	1,482	1,694	1,906	2,118	2,330	2,542	2,754	2,966	3,178	3,390	3,602	3,814
"	"	14 "	1,597	1,825	2,053	2,281	2,509	2,737	2,966	3,194	3,422	3,650	3,878	4,106
"	"	15 "	1,711	1,955	2,200	2,444	2,688	2,933	3,178	3,422	3,667	3,911	4,156	4,401
"	"	16 "	1,825	2,085	2,346	2,607	2,867	3,128	3,389	3,650	3,911	4,172	4,433	4,694
"	"	17 "	1,939	2,216	2,493	2,770	3,047	3,324	3,602	3,878	4,156	4,433	4,710	4,987
"	"	18 "	2,053	2,346	2,640	2,933	3,226	3,520	3,814	4,106	4,401	4,694	4,987	5,280
"	"	19 "	2,167	2,477	2,786	3,096	3,405	3,715	4,024	4,334	4,643	4,953	5,262	5,572
"	"	20 "	2,281	2,607	2,933	3,259	3,585	3,911	4,237	4,563	4,889	5,215	5,541	5,867

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